DOCUMENT RESUME

ED 147 178 SE 023 356

| | |
|---|---|
| TITLE | National Environmental/Energy Workforce Assessment for Region VI. |
| INSTITUTION | National Field Research Center Inc., Iowa City, Iowa. |
| SPONS AGENCY | Environmental Protection Agency, Washington, D. C. |
| PUB DATE | 77 |
| GRANT | EPA-T-900591010 |
| NOTE | 112p.; For related documents, see SE 023 292-360 |
| EDRS PRICE | MF-$0.83 HC-$6.01 Plus Postage. |
| DESCRIPTORS | Air Pollution Control; *Career Opportunities; *Educational Programs; Energy; Environment; *Manpower Needs; National Surveys; Pesticides; *Pollution; Post Secondary Education; Radiation; *State Legislation; Water Pollution Control |
| IDENTIFIERS | Noise; Solid Wastes |

ABSTRACT

This report represents a detailed summation of existing workforce levels, training programs, career potential, and staffing level projections through 1981 for EPA Region VI. This region serves the Gulf fringe states of Texas, Arkansas, New Mexico, Oklahoma, and Louisiana. The specific pollution programs considered include air, noise, pesticides, potable water, radiation, solid waste, and wastewater. Additionally, a section overviewing current activities in energy as it relates to pollution control and abatement is included. The content of each section is limited to the control authority which EPA possesses. The study was undertaken to provide a strategy for supporting and implementing environmental education and career training programs based on needs and growth trends evidenced by the initial workforce assessment. A selected bibliography is included for reference. (CS)

**********
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
**********

ED147178

# A National Environmental/Energy Workforce Assessment

## REGION VI

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

**Conducted by:**

**National Field Research Center, Inc.**

**P.O. Box 287**

**Iowa City, Iowa 52240**

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Donald Cook

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

SE 023 356

NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

# REGION VI

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

This document has been reviewed by the Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

National
Field
Research
Center, Inc.

Box 287 Iowa City, Iowa 52240 (319) 351-8789

# INTRODUCTORY NOTE

The National Environmental/Energy Workforce Assessment was conducted by National Field Research Center, Inc. with main offices in Iowa City, Iowa. The following personnel have had primary responsibility for the Assessment and project report.

IOWA CITY, IOWA
Dr. Darold E. Albright, President
Paul E. Bridges, Executive Director
Dr. Richard L. Benesh, Project Director
Judith J. Gordon
Alan M. Stowell
Anita M. Stowell
Mary Kay (Edge) Wade

ATLANTA, GEORGIA
Elizabeth G. Nielsen, Regional Director
Robert Oxberger

DENVER, COLORADO
Nancy C. Dillenberg, Regional Director

SEATTLE, WASHINGTON
Steven Silva, Regional Director

WASHINGTON, D.C.
Frank E. Smith, Project Coordinator
Lloyd B. Chaisson, Assistant Project Coordinator
Jack F. Seum

Additional research and clerical assistance was provided by Frederick M. Wall, Maxine Wolfe, Margaret Fehn, Sandra Hogsed, Karen Kirchoff, Sharon Lerker, Marilyn Low, Mary McCormac, and Joan Urquhart.

FIELD OFFICES

ATLANTA
2000 Cumberland Pkwy
Suite 150
Atlanta, GA 30339
(404) 433-2644

DENVER
2600 S. Parker Rd.
Suite 160, No. 6
Denver, CO 80232
(303) 751-4962

SEATTLE
927 United Pacific Bldg.
1000 2nd Ave.
Seattle, WA 98101
(206) 623-9170

WASHINGTON, D.C.
1522 K Street, N.W.
Suite 600
Washington, D.C. 20005
(202) 223-9138

TABLE OF CONTENTS


| | Page |
|---|---|
| ILLUSTRATIONS | iii |
| ACKNOWLEDGEMENT | v |
| PREFACE | vi |
| FOREWORD | vii |
| REGIONAL PROFILE | 2 |
| ORGANIZATIONAL AND OPERATIONAL STRUCTURE OF U.S. EPA REGION VI | 4 |
| REGIONAL POLLUTION CONTROL AND ABATEMENT PROGRAMS | 11 |
| Air | 12 |
| Noise | 20 |
| Pesticides | 24 |
| Potable Water and Wastewater | 32 |
| Radiation | 47 |
| Solid Waste | 52 |
| Energy | 58 |
| SUMMARY | 65 |
| BIBLIOGRAPHY | 68 |

ILLUSTRATIONS


| Figure | | Page |
|---|---|---|
| 1 | U.S. Environmental Protection Agency, Region VI - Dallas, Texas - Organizational Chart | 5 |
| 2 | U.S. Environmental Protection Agency, Region VI - Dallas, Texas - Organizational Chart - Illustrating Surveillance & Analysis Division | 6 |
| 3 | U.S. Environmentl Protection Agency, Region VI - Dallas, Texas - Organizational Chart - Illustrating Air & Hazardous Materials Division | 7 |
| 4 | U.S. Environmental Protection Agency, Region VI - Dallas, Texas - Organizational Chart - Illustrating the Enforcement Division | 8 |
| 5 | U.S. Environmental Protection Agency, Region VI - Dallas, Texas - Organizational Chart - Illustrating the Management Division | 9 |
| 6 | U.S. Environmental Protection Agency, Region VI - Dallas, Texas - Organizational Chart - Illustrating the Water Division | 10 |

| Table | | Page |
|---|---|---|
| I | Region VI Air Pollution Control Personnel, Current (1976) Staffing Level | 14 |
| II | Region VI Air Pollution Control Personnel, Workforce Projections to 1982 (est.) | 16 |
| III | Air and Hazardous Materials Division Pesticides and Hazardous Materials Branch Pesticides Program, Current (1976) Staffing Level | 26 |

| Table | | Page |
|---|---|---|
| IV | Air and Hazardous Materials Division Pesticides and Hazardous Materials Branch Workforce Projections to 1982 (est.) | 27 |
| V | Water Division, Potable Water and Wastewater Personnel, Current (1976) Staffing Level | 38 |
| VI | Water Division, Potable Water and Wastewater Personnel, Workforce Projections to 1982 (est.) | 41 |
| VII | Air and Hazardous Materials Division Pesticides and Hazardous Materials Branch Hazardous Waste Management Section, Workforce Projections to 1982 (est.) | 49 |
| VIII | Air and Hazardous Materials Division Pesticides and Hazardous Materials Branch Hazardous Waste Management Section Solid Waste Personnel, Workforce Projections to 1982 (est.) | 55 |

ACKNOWLEDGEMENT

This report was prepared under the auspices of a grant from the U. S. Environmental Protection Agency. To those persons who were kind enough to assist the research staff, the National Field Research Center extends sincere appreciation.

# PREFACE

This study presents an overview of existing workforce levels, training programs, career potentials and major activities within the Region VI office of the U.S. Environmental Protection Agency (EPA). Staffing level projections (1976-1982) are also developed based upon available information. EPA program areas included in this report are: air, noise, pesticides, potable water, radiation, solid waste, and waste water. In addition, a section relating to Federal activities in the area of energy conversion/ conservation has been included, providing similar information to that of the respective EPA sections.

This Regional report is designed to supplement five additional reports, one for each State within Region VI. The information and data presented in this and the other reports were compiled largely as a result of interviews with professionals working in the respective areas. It should be pointed out that the data, where not documented by records, represent the best professional judgements of these experts.

## FOREWORD

Information for this report was largely compiled from on-site interviews with professionals within the Region VI, U.S. Environmental Protection Agency (EPA). For increased reliability, interviews were supplemented with telephone conversations for clarification and revalidation of information. It must be noted that a large portion of the information contained herein represents the best professional judgements of those persons surveyed. In cases where more than one person provided input for a single program area, compilation of figures and recommendations was provided by the author.

This report provides information concerning the pollution control fields of the EPA. The pollution control areas included are: air, noise, pesticides, potable water, radiation, solid waste, waste water, and energy. Within EPA, the compartmentalization of employees into these eight areas is not a completely clearcut process. Functions occasionally overlap, inter-divisional cooperations occur, and certain components serve a supporting role to the entire Agency. Efforts were made in preparation of this report, however, to provide sufficient information for the reader to have an understanding of major linkages and roles, and to provide divisions of the workforce in a logical, realistic, and understandable manner.

While care was taken to provide comprehensive information regarding workforce levels, workforce projections, reasons for growth/decline, training programs and career potentials, as related by professionals, certain program functions have been abbreviated.

# National Environmental Energy Workforce Assessment

## Phase I

# REGION VI

## Report

## REGIONAL PROFILE

The five state Gulf fringed area of Texas, Arkansas, New Mexico, Oklahoma, and Louisiana is referred to by the U.S. EPA as Region VI. This area is made up of 550,843 square miles and is the home of many Indian tribes. Osage, Apache, Cheyenne, Arapahoe, Kiowa, Commanche, Pawnee, Hopi, Navaho, and Pueblo are representative of the tribes which occupied these lands before the coming of the white man.

The population of Region VI numbers approximately 20,350,000. The population density (persons per square mile) ranges from a high in Louisiana of 81.0 to a low of 8.4 in New Mexico. With the inclusion of Oklahoma, Texas, and Arkansas, the population density, as an approximate average of the five state area, is 41.2 persons per square mile. The national average is 57.3 persons per square mile. For the sake of comparison, EPA Region VIII has two cities with populations in excess of 100,000. Region VI, however, has twenty; thirteen of which are within the Texas borders.

The topography of the region varies from the rolling pairies and Mississippi marshlands to the high plains and scattered mountain ranges. The elevations extend from 15 feet below sea level in Louisiana to 13,160 feet above in New Mexico. Overall, the climate may be described as the contential type with pronounced daily and seasonal temperature changes. Hurricanes and tornadoes are not uncommon to this region.

Manufacturing industry, according to the Standard Industrial Classification (S.I.C.) codes, includes: chemicals, coal and petroleum products, paper, primary metals, lumber and wood, petroleum refining, and construction equipment.

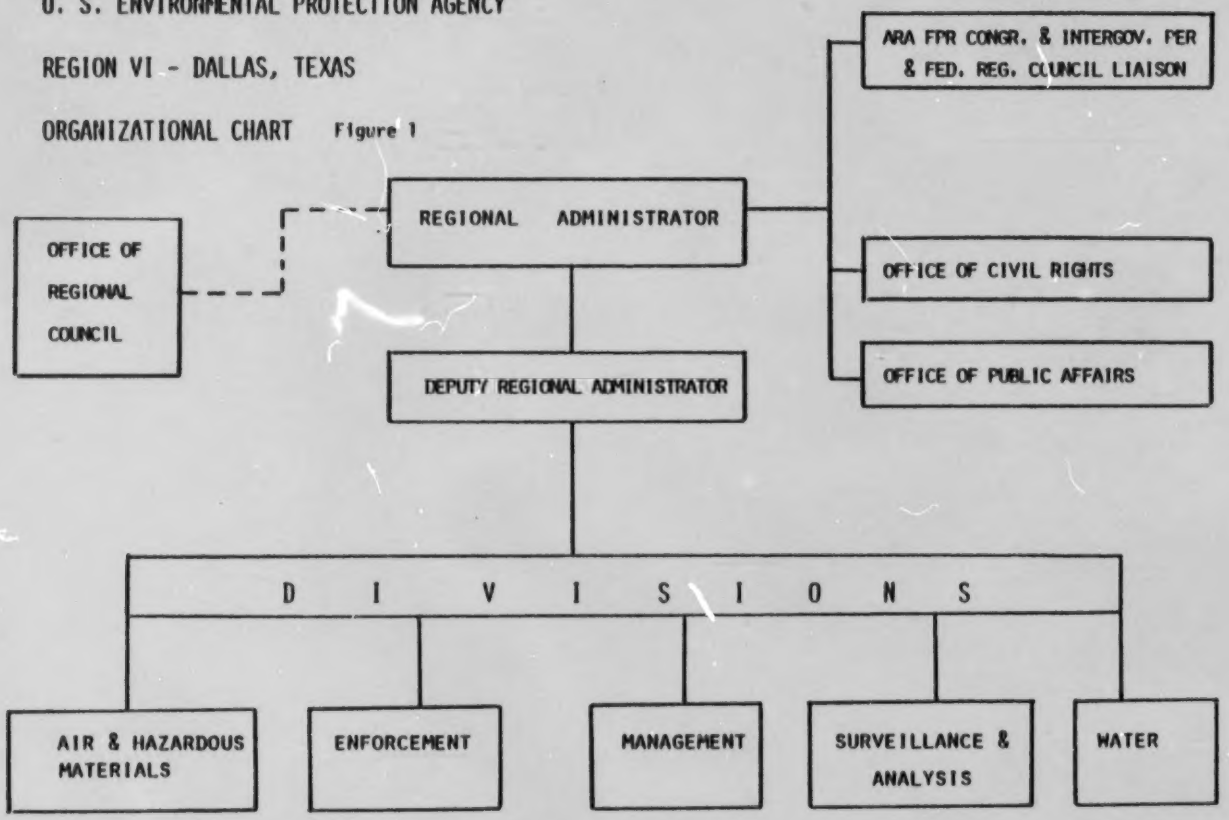
The presence of large quantities of petroleum, natural gas, stone, gem stones, sand and gravel as well as other minerals in lesser quantities, adds substantially to the overall economic base of the region. Texas, for example, is responsible for more than 22% of the total U.S. mineral resources.

# Organizational and Operational Structure

U. S. ENVIRONMENTAL PROTECTION AGENCY

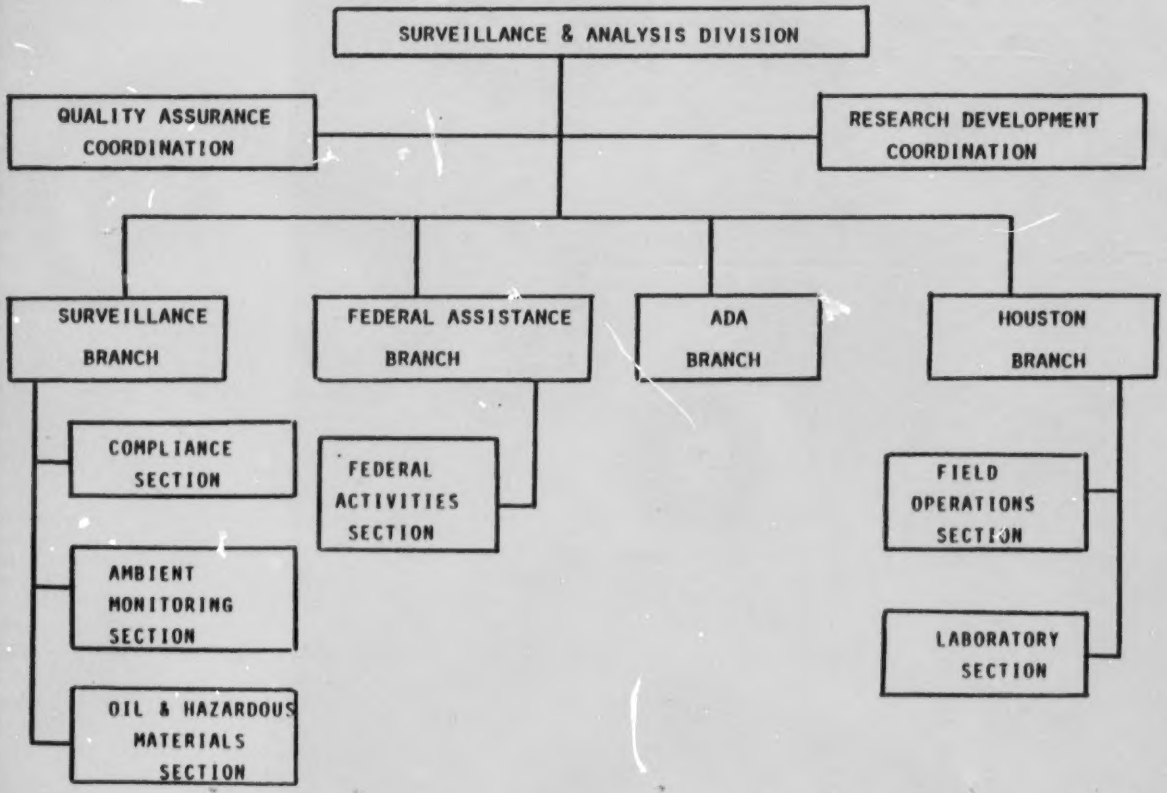
REGION VI - DALLAS, TEXAS

ORGANIZATIONAL CHART Figure 1



U. S. ENVIRONMENTAL PROTECTION AGENCY Figure 2

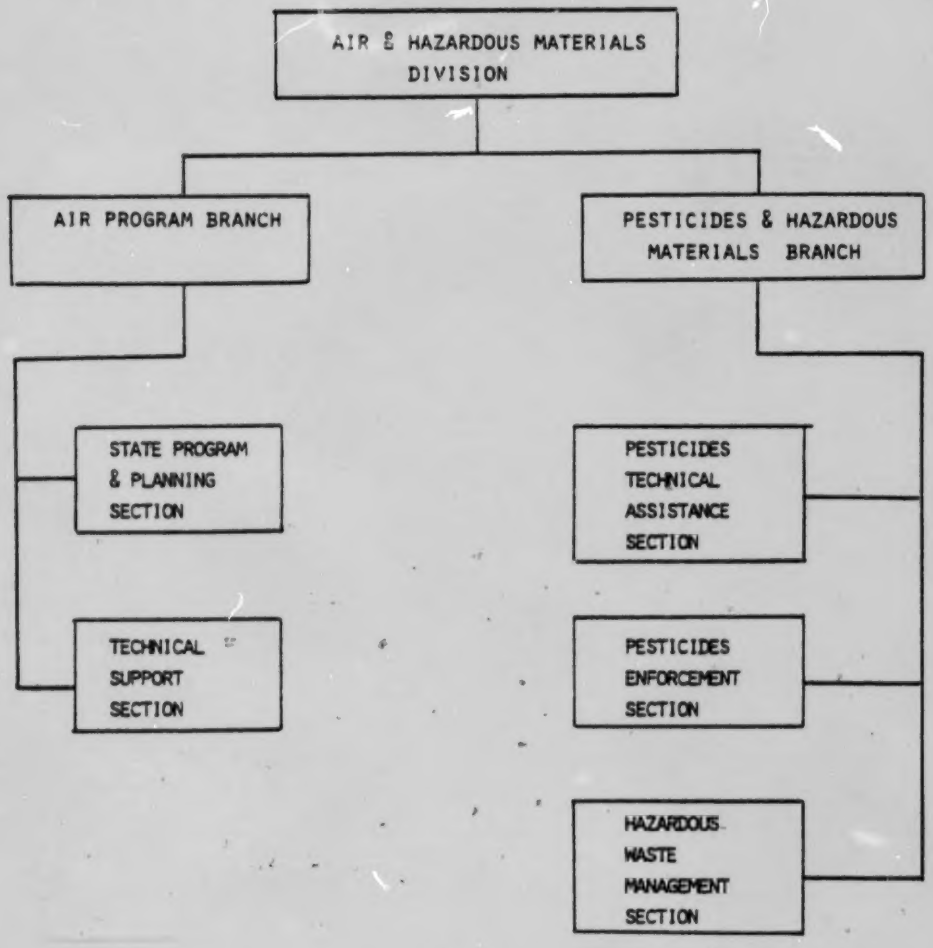
REGION VI - DALLAS, TEXAS - ORGANIZATIONAL CHART - Illustrating Surveillance & Analysis Division



U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION VI - DALLAS, TEXAS Figure 3

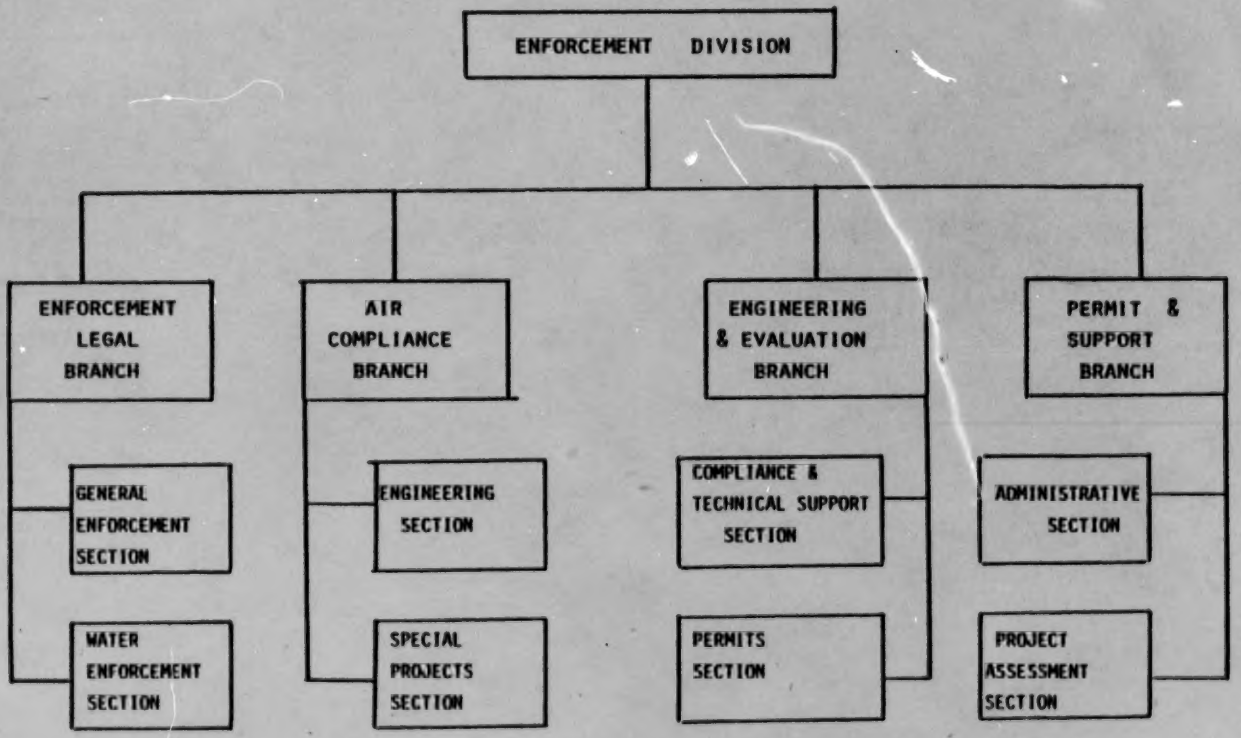
ORGANIZATIONAL CHART - Illustrating Air & Hazardous Materials Division


AIR & HAZARDOUS MATERIALS DIVISION
AIR PROGRAM BRANCH
PESTICIDES & HAZARDOUS MATERIALS BRANCH
STATE PROGRAM & PLANNING SECTION
TECHNICAL SUPPORT SECTION
PESTICIDES TECHNICAL ASSISTANCE SECTION
PESTICIDES ENFORCEMENT SECTION
HAZARDOUS WASTE MANAGEMENT SECTION

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION VI - DALLAS, TEXAS Figure 4

ORGANIZATIONAL CHART - Illustrating the Enforcement Division

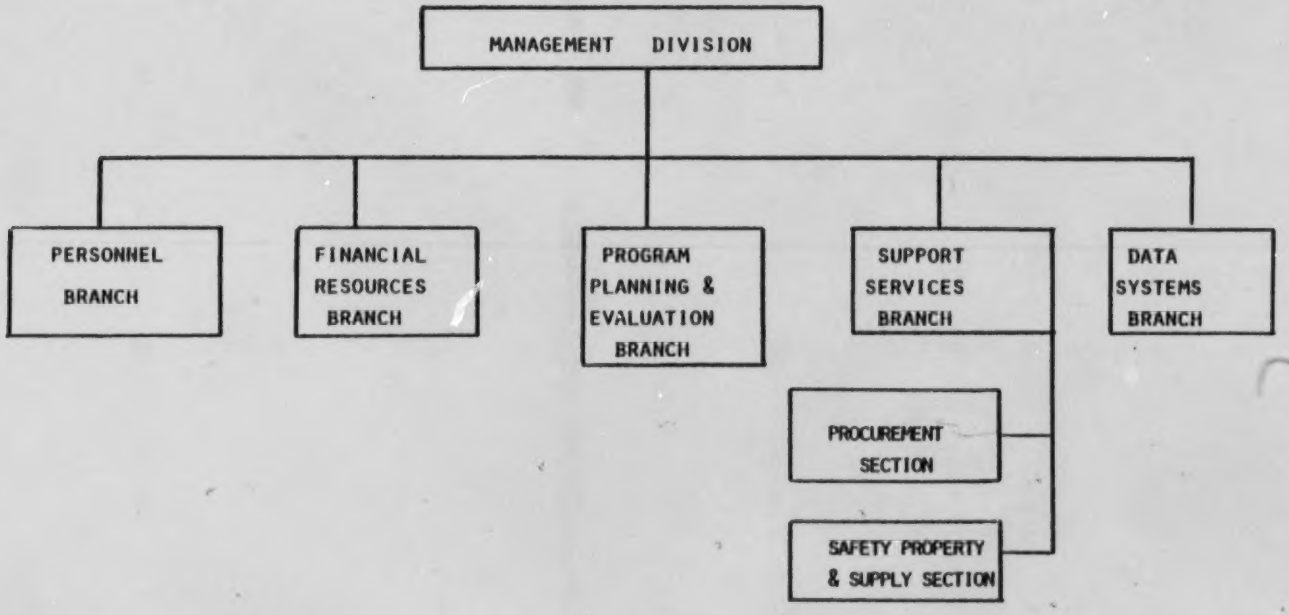



8

U. S. ENVIRONMENTAL PROTECTION AGENCY Figure 5

REGION VI - DALLAS, TEXAS

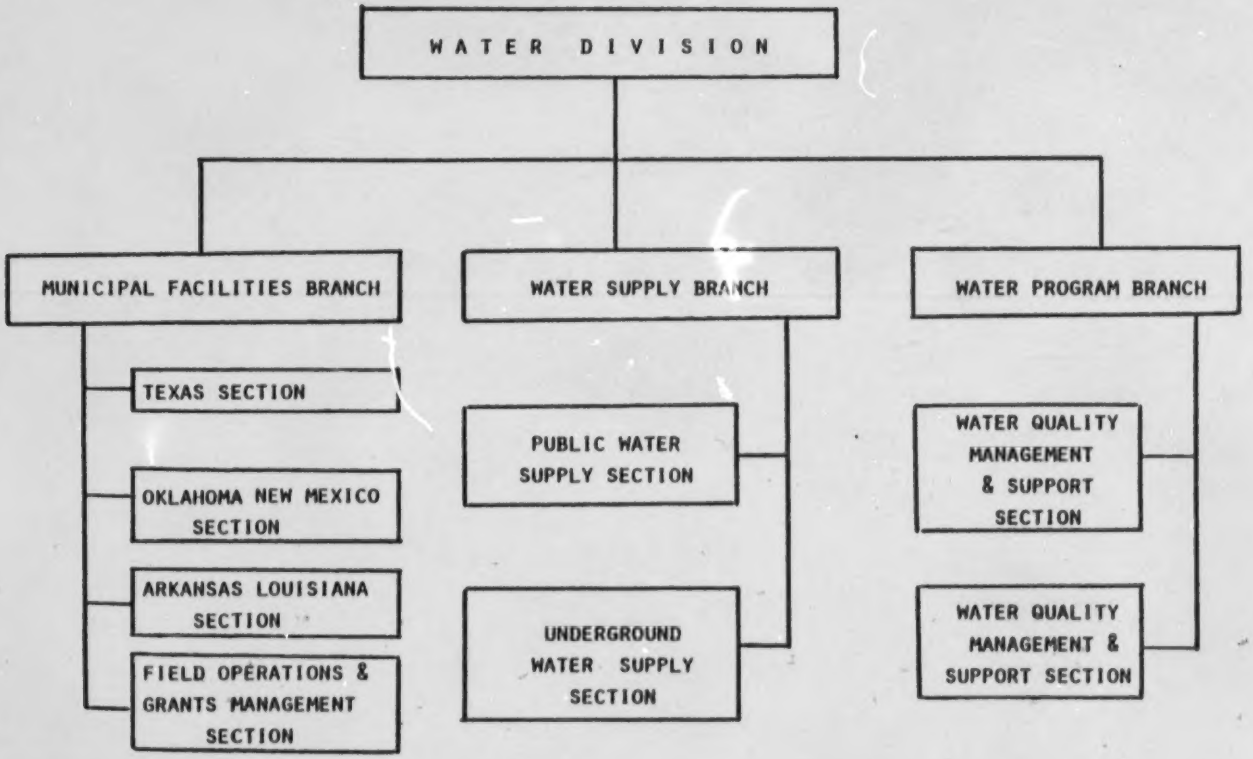
ORGANIZATIONAL CHART - Illustrating the Management Division



U. S. ENVIRONMENTAL PROTECTION AGENCY Figure 6

REGION VI - DALLAS, TEXAS

ORGANIZATIONAL CHART - Illustrating the Water Division



# Regional Pollution Control and Abatement Programs

I. AIR

A. Workforce Profile

Air pollution problems are as prevalent in Region VI as in most other areas of the country. Unique problems, however, do exist in this region. For example, the altitude of New Mexico's largest city, Albuquerque, contributes to the creation of air quality problems not present at sea level. It is extremely difficult to tune an automobile engine and keep it tuned at altitudes in excess of 5,000 feet. The petrochemical industries of Texas present rather area-specific types of air quality problems.

The majority of air pollution control activities at EPA Region VI take place within the Air Program Branch of the Air and Hazardous Materials Division, the Surveillance and Analysis Division, and the Air Compliance Branch of the Enforcement Division. While these Branches perform a wide range of activities as they relate to air pollution control and abatement, the 1970 Clean Air Act, as amended, provides their principal operational authority. Specifically, the Air Program Branch assists states by: developing State Implementation Plans (SIP), extensively reviewing the SIP's, lending technical assistance to the air pollution control programs, and distributing program grant monies to state and local agencies. This Branch also develops technical studies for Air Quality Maintenance Plans (AQMP) and conducts indirect source and non-significant deterioration facility reviews. In addition, an assessment of state air quality data to determine programs toward attainment and maintenance of standards is ongoing.

The Air Compliance Branch is responsible for providing overall program policy and technical direction for regional air enforcement activities and for evaluating air compliance status within the Region. This includes evaluation of current air compliance status of stationary sources, including those affected by SIP's, new source performance standards (NSPS), and national emission standards for hazardous air pollutants (NESHAPS), and the compliance of mobile sources, including those affected by transportation control plans (TCP) and federal regulations for fuels and fuel additives.

The Surveillance, Federal Assistance, Ada, and Houston Branches of the Surveillance and Analysis Division also provide substantial support to the air pollution control program, in addition to assistance to the other Region VI environmental programs. These Branches are responsible for conducting the ambient air quality monitoring programs based on regional and national needs. Further, these Branches are responsible for conducting field investigations, providing consultant services, technical assistance, and scientific analytical services to all regional programs.

The following table represents the number of persons engaged full-time in the air pollution control program. It should be noted that in addition to the efforts of the Air and Hazardous Materials Division, Enforcement Division, and Surveillance and Analysis Division, the Regional Administrator's Office and the Management Division provide administrative support to the air program.

TABLE I

REGION VI AIR POLLUTION CONTROL PERSONNEL*

Current (1976) Staffing Level

| Position | 1976 |
|---|---|
| Engineer | 11 |
| Scientist | 2 |
| Technician | 4 |
| Training Aide | 2 |
| Other | 37 |
| TOTAL | 56 |

*Includes personnel from Air and Hazardous Materials Division, Enforcement Division, and Surveillance and Analysis Division.

In total, there are 56 people devoting their efforts to air pollution control activities in the Region VI offices. Of these personnel, 16 represent the Air and Hazardous Materials Division, 20 represent the Enforcement Division, 18 are employed in the Surveillance and Analysis Division, and two are in regional management. Of the total number of air program employees who could be identified by profession, 11 are engineers (environmental, mechanical, sanitary, chemical, and acoustical), two are scientists, four are technicians (engineering, environmental protection, physical science), and two are aides (student and environmental protection). The 'other' category includes the following positions: attorney, engineer, environmental protection specialist, chemist, environmental engineering technician, maintenance mechanic, and clerical. Because several Branches provide support to all the environmental programs and

the author was not provided with comprehensive information on the allocation of personnel by position to the air program, it was necessary to assign the majority of air program staff to the 'other' category in the table. The classifications of environmental protection specialist and environmentalist represent professional administrative personnel who do not necessarily hold degrees in engineering or the sciences.

B. Workforce Projections

As stated in the Region VI FY 78-82 Preview Submission document, the primary goal for the next five years should be the attainment and maintenance for all National Ambient Air Quality Standards (NAAQS). Shorter range objectives include:

- Review of attainment and maintenance status for NAAQS in all areas;
- Promulgation of additional control measures being developed in FY 77 and 78;
- Continued surveillance of the new source review (NSR) process; and,
- Continued surveillance of compliance of existing sources with SIP, NSPS, NESHAPS, and PSD requirements.

The Preview Submission document indicates that in the next several years, the abatement and control staff of the air program will concentrate on such activities as processing current and anticipated SIP revisions, auditing NSR, PSD, and fuel switching, administering air control grants, and correcting SIP deficiencies in the area of air quality impact. Moreover, increasing demands related to NSPS, NESHAPS, and fuel switching are creating additional resource requirements in stationary

source enforcement. Implementing and enforcing oxidant control strategies and adequately evaluating data from ambient monitoring networks will also necessitate an increased air program workforce. In sum, to approach the FY 78 "hard needs" projections for EPA Region VI, a staffing increase of 16 persons is required.

Historically, the air program has been staffed well below the level required to fulfill program requirements effectively. The assumption that this trend will continue, rather than the supposition that anticipated program needs will be met, is likely to yield more valid workforce projections. According to professional judgements of air program officials, workforce growth may be expected to proceed at an average per annum rate of less than five percent. Table II depicts workforce projections to 1982, by position, for the Region VI air program.

TABLE II

REGION VI AIR POLLUTION CONTROL PERSONNEL*

Workforce Projections to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum growth (average) |
|---|---|---|---|---|---|---|---|
| Engineer | 11 | 11 | 11 | 12 | 12 | 13 | 3% |
| Scientist | 2 | 2 | 2 | 2 | 2 | 2 | 0% |
| Technician | 4 | 4 | 6 | 8 | 10 | 12 | 26% |
| Aide | 2 | 2 | 2 | 2 | 2 | 2 | 0% |
| Other | 37 | 37 | 38 | 39 | 39 | 39 | 1% |
| TOTAL | 56 | 56 | 59 | 63 | 65 | 68 | 4% |

* Includes Air and Hazardous Materials Division, Enforcement Division and Surveillance and Analysis personnel.

The largest amount of growth is projected to occur in the engineer, technician, and attorney (other) positions. However, no area will experience significant increases. The technician category tends to skew the

growth pattern since even a minimal personnel increase reflects a substantial percentage growth. Overall, then, growth in the air program may average four percent per year over the next five years.

C. Training and Certification

Upgrade training is offered to every employee engaged in the field of air pollution control at Region VI EPA. Management, administrative, and basic skill type courses are sponsored by the Civil Service Commission. In addition, EPA technical courses are offered, usually through Research Triangle Park. Technical courses that are offered and taken advantage of include: "Legal Aspects for Control Agency Decision Makers", "Air Pollution Field Enforcement", "Principles and Practices of Air Pollution Control", "Meteorology", "Statistical Evaluation of Air Pollution Data", and "Combustion Evaluation". Administrators may become involved in an Executive Development Program, in which courses are offered mainly by EPA and the Civil Service Commission for the development of managerial skills.

Through the Surveillance and Analysis Division, courses are usually offered to state and local personnel engaged in air pollution control. Training courses in visible emissions evaluation are offered by state personnel. These training courses vary in length from two to four days. In addition, workshops are conducted relative to air pollution control.

Nationally, EPA has cut back on direct air pollution training offered to regional, state and local personnel, and has instituted "user charges",

which have contributed to a decline in state and local participation. Some state personnel said that EPA courses offer too much theory and environmental principles and too little practical material for everyday application.

For future training, the Air Pollution Training Institute at Research Triangle Park will continue to conduct courses offered in the Region.

D. Career Potential

No substantial growth is expected for the Region VI air programs effort over the next five years. Slight growth will occur in engineering, technician, and attorney positions. No new or unique careers appear to be emerging in the field. In the absence of significant staffing increases, existing staff members are likely to have their responsibilities expanded. New technology may require upgrade or cross-training, and new, more stringent legislation may require staff growth beyond present expectations.

E. Conclusion

Several resource intensive problem areas exist for the Region VI air program. First, any challenge by EPA to state issued permits for new or modified sources can require a large resource expenditure, in particular, if court action ensures. Second, processing the revisions to SIP's is extremely resource intensive. Third, a strategy must be developed and implemented for control of minor sources. Fourth, in terms of toxic pollutants, either the NESHAPS and NSPS method or the 111 (d) alternatives would constitute a heavy drain on resources, at least initially. At present, SIP enforcement is suffering as a result

of the effort required for the NSPS and NESHAP activities. Fifth, a considerable workforce will be required to facilitate the administrative, legal, and technical requirements involved in the extensive fuel switching which will accompany energy conservation measures. Finally, while increased delegation of responsibility to the states would relieve some of the strain on the resources of the air program, state agencies are constrained in the amount of responsibility they can accept because of legislative limits on personnel and/or matching dollars.

Thus, although few increases in staff may occur, whether these additions will be sufficient to fulfill the growing program responsibilities remains problematic. Program officials anticipate an average per annum growth rate of less than five percent over the next five years. This growth rate may not keep pace with regulatory demands. In essence, without substantial increases in the anticipated budget, new regulations and legislation may result in extending the program staff beyond the point of achieving air pollution control goals.

## II. NOISE

### A. Workforce Profile

Noise pollution problems across Region VI are, for the most part, directly related to areas of large population concentration. Airports, for example the massive Dallas-Fort Worth complex, are also contributors to noise related problems.

One unusual area of concern regarding noise control involves the development of energy resources. Environmental noise associated with energy extraction and conversion activities may be exceedingly intense. This is a relatively new area of concern and one which is not represented in several of the other federal EPA regions.

The Region VI noise program is administered by means of authority vested in Section 14 of the Noise Control Act of 1972. This Act authorizes EPA to provide technical assistance to state and local governments. Noise program activities are conducted by the Air Program Branch of the Air and Hazardous Materials Division. Specifically, the Technical Support Section of this Division has been designated as the principal liaison between EPA and all state and local agencies in Region VI on all matters concerning noise control. This Section also provides technical assistance in the development of noise control programs. Presently allocated to the noise control program is one full-time acoustical engineer.

B. Workforce Projections

Since there is only limited specific noise legislation and even more limited funding, Region VI officials expect little, if any, workforce growth. According to the Region VI FY 78 - 82 Preview Submission document, FY 78 "hard needs" for noise program implementation are equivalent to the current staffing level, that is, one person. FY 78 optimum staffing needs are expressed as three professional persons. Two of these positions would be required to determine the most effective controls to be implemented by state and municipal agencies to reduce noise from specific sources. However, whether or not the FY 78 optimum staffing level is realized by that year, or even in five years, is dependent upon future legislation and regulations at the federal, state, and local levels. Alteration of allowable community noise levels could result in staff growth. National quiet cities and quiet neighborhoods programs would further serve to expand noise control efforts. Program staff might be involved in noise surveys, assessments, enforcement activities, ordinance development and community education efforts. Specific areas of concern could include construction noise, boundary line emissions, planning, highway and airport noise. Much of the foregoing, however, remains speculative; accordingly, specific workforce projections cannot be made.

C. Training and Certification

In-house staff may take part in EPA-sponsored managers' programs and occasionally other seminars relating to legislation, enforcement, and planning. Additional program staff would require on-the-job training which might take the form of informal one-to-one training with a currently

practicing professional. Training courses are available to a limited degree, through local colleges, universities, and equipment manufacturers. Such courses are in the area of instrumentation, design, physics and acoustics. Since the field is growing so slowly, providing advanced training or developing unique noise skills is not presently required.

Region VI conducts an annual Regional Noise Seminar to provide training for state and local officials in subjects concerning environmental noise and offers technical advice to state and local governments on types and uses of sound measurement and analysis instruments. State and local governments may borrow sound level meters and other types of equipment from the Region VI noise office.

It is anticipated that eventually seminars will be held semi-annually as more state and local officials become aware of community problems resulting from lack of noise control programs.

D. Career Potential

Career opportunities in the noise field are presently limited. The immediate future may require new combinations of engineering skills with emphasis on product/structure design and acoustics, but no new or unique careers are anticipated to emerge. A workforce of individuals trained in instrumentation may be required at the local level for enforcement activities, but these people would be likely to use these skills in the performance of their regular jobs, e.g., law enforcement. At the degreed career level, emphasis will continue to be given to the physics and engineering disciplines.

E. Conclusion

The limited expansion that is projected within the field of noise abatement and control is due in part to the fact that the effects of noise are not yet as visible to the public as are the effects of other types of pollution; consequently, public concern is not as great. There will continue to be positions in industry for design engineers and scientists with backgrounds in acoustics and physics, but these positions will be few and noise activities will be conducted in conjunction with other duties. Airport, highway, and urban/suburban noise will become matters of increasing concern, but it will require public awareness and concern for programs to expand. Problems will most likely be resolved at the state and local levels with existing resources. As a consequence, noise control and abatement career opportunities at the Regional level are anticipated to develop slowly, although significant, definitive legislation could alter future needs more rapidly.

## III. PESTICIDES

### A. Workforce Profile

The two major economic activities within Region VI are agriculture and mineral extraction. The area of pesticide control, then, is one of great importance to the Region.

For the most part, the states of Region VI have developed State Pesticide Plans pursuant to the federal legislation. The training of pesticide applicators in the private and in the commercial areas has begun. The use of toxicants crosses into the rather volatile issue of predator control. While the issue of predation is not as highly emotionally charged in Region VI as in other areas, it is to the credit of EPA Region VI pesticides personnel that this program has met with such an outstanding degree of success. The fact that Region VI borders Mexico presents problems not experienced elsewhere.

The Region VI pesticides program branch is located within the Air and Hazardous Materials Division, Pesticide and Hazardous Materials Branch. Responsibilities include planning, recommending, implementing, and evaluating an approved regional program as set forth in the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended.

The Branch is composed of the Pesticide Technical Assistance Section and the Pesticide Enforcement Section. The former section is responsible for developing and coordinating ongoing state cooperative programs to implement FIFRA and its amendments. Such programs include provisions for certification of pesticide applicators, registration of

products for special local needs, registration for experimental use, and development of pesticide disposal mechanisms. This last function is especially important since the disposal of pesticides containers remains a problem in Region VI.

The Pesticide Technical Assistance Section also has important responsibilities in the area of pesticide use consequences. Objectives pertaining to this area are development of a workable pesticide accident reporting and investigation network and establishment of a viable safety-in-use program. Additional functions of this Section include providing assistance to cooperative, interagency training programs for private applicators (farmers) and commericial applicators, updating and expanding of state profiles, reviewing state pesticide plans and legislative capability, and providing technical assistance for special programs.

The primary goal of the Pesticide Enforcement Section is to achieve total compliance with FIFRA for the purpose of protecting the environment and consumers against the health hazards of economic poisons. FIFRA provides for the following enforcement tools, which are administered by this Section: Stop-Sale, Use and Removal Orders; Seizures; Warning Notices; Registration Cancellation; Voluntary Recall Actions; and Civil and Criminal Prosecutions.

As with the Air Program, the Pesticides and Hazardous Materials Branch receives assistance in its programs from the Enforcement and Surveillance and Analysis Divisions. Program staff in these Divisions carry out activities which support FIFRA, as amended.

Currently, the Pesticides program has a staff of 19 professional, technical, and clerical workers. The staffing levels of the program, by position, are depicted in the following table.

TABLE III

AIR AND HAZARDOUS MATERIALS DIVISION

Pesticides and Hazardous Materials Branch
Pesticides Program
Current (1976) Staffing Level

| Position | 1976 |
|---|---|
| Scientist | 10 |
| Technician | 1 |
| Other | 8 |
| TOTAL | 19 |

The scientist category includes three pesticide specialists, one entomologist, and six consumer safety officers. These persons have four year, advanced degrees, and/or extensive experience in the sciences. The technician is an environmental protection assistant, a position which generally requires an associate's degree or two years of higher education. Included in the 'other' category are a branch chief, a section chief, a pesticide enforcement program specialist, and five clerical positions.

B. Workforce Projections

Pesticide Program officials indicate that, on the whole, the states are doing an excellent job of administering their responsibilities under FIFRA. Staffing in the Pesticide Program in Region VI, however, is projected to increase as a result of stricter regulations that require additional personnel and more extensive enforcement activities.

The increases that do occur will be utilized to assume the additional registration duties that are being transferred to the Regions and to expand the scope of the pesticide enforcement program. Expansion of the enforcement program will be necessitated by the requirement that re-registration and classification of pesticides as to category (general or restricted)

be conducted. Moreover, establishment inspections will be increasing to include those firms which produce pesticides for intrastate sale only and, therefore, were not subject to regulations under FIFRA. Also included in the inspections are firms which produce restricted-use pesticides. These firms will be subject to closer scrutiny and follow-up investigations. Additionally, mass observations of restricted use pesticide applications are projected for FY 1978, thus requiring investigative and case development time. Finally, State Enforcement Grants are expected to double in FY 1978, with a resultant increase in resources consumed for training and grants administration. Table IV depicts the workforce growth projected to take place in pesticides, according to estimates of professionals in the field. While the figures may be low with regard to reflecting actual needs, they are felt to be the most realistic estimates possible.

TABLE IV

AIR AND HAZARDOUS MATERIALS DIVISION

Pesticides and Hazardous Materials Branch
Projected Workforce Requirements-1982
(estimated)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum growth (average) |
|---|---|---|---|---|---|---|---|
| Scientist | 10 | 10 | 12 | 13 | 13 | 13 | 6% |
| Technician | 1 | 1 | 1 | 1 | 1 | 1 | 0% |
| Other | 8 | 8 | 9 | 9 | 9 | 9 | 3% |
| TOTAL | 19 | 19 | 22 | 23 | 23 | 23 | 4% |

The increase in the number of scientists reflects the addition of consumer safety officers to the enforcement staff. Consumer safety officers generally conduct field inspection activities. The increase in the 'other' category may be for either a program specialist, grants

administrator, or clerical position. In aggregate, growth is anticipated to proceed at an average per annum rate of four percent. This is significantly lower than the hard and optimum growth projections set forth in the FY 78 - 82 Preview Submission document. If FY 78 hard or optimum needs were actually to be realized by 1981, an annual average growth rate of approximately 10% to 14% would have to occur over the next five years. It appears that this rate of growth will not be approached, and, consequently, that program responsibilities will increase at a rate greater than anticipated staffing growth.

C. Training and Certification

All new entrants to pesticide programs may receive informal on-the-job training, or upon occasion training may be more structured. The new entrant may spend an extended length of time assigned to field personnel. Regional office training may include sessions emphasizing laws, regulations, and procedures. In addition, the Branch endeavors to keep employees up-to-date on current issues and activities relative to pesticides.

Management and clerical courses are available to anyone through the Civil Service Commission. Technical upgrade training for personnel is available to some extent through such groups as the Federal Aviation Administration, the Food and Drug Administration and the Association of Federal Investigators. Also, a Federal training school for investigators exists near Washington, D.C., which could be valuable for the Pesticides Branch personnel able to travel out of the Region. Lack of funds, however, can curtail travel.

Training offered by the Pesticides Branch takes several forms. The Branch assists the state lead agencies and the Cooperative Extension Services in their own training by making presentations at conferences and seminars. The same type of situation exists with other Federal agencies, such as the Department of Agriculture, the Food and Drug Administration, and the Federal Aviation Administration, whereby the Pesticides Branch is available through cooperative agreements to assist these agencies when necessary.

Direct training to state regulatory agencies takes place when states receive their federal training grants under the Act. Classroom and field training may be conducted by the Branch with appropriate state personnel. Although the length of training depends upon the status and needs of each state program, classroom and field training may vary from two days to one week.

The lack of travel funds, however, prevents the widespread on-site training assistance to the states. A major expressed training need is in the area of analysis methods consistent with EPA practices and policies. State pesticides enforcement programs could benefit substantially through laboratory training. A large percentage of pesticides violations may be determined through chemical laboratory testing.

D. Career Potential

It appears that the major increases in staff will be at the state level, and very few career opportunities will be available at the federal level. However, at the federal level, those positions most likely to

become available will require persons with backgrounds in agriculture and natural science fields. Integrated Pest Management (IPM) practices could also bring about staff increases in the form of persons with broad based science backgrounds; however, funding for IPM at the regional level does not appear likely in the near future. If greater than anticipated funding is forthcoming, the future could possibly bring positions for laboratory research and analysis personnel as the number of different and potentially dangerous products proliferates. These positions, for the most part, would require professional degrees. Technical positions could occur in the laboratory and in the field for registration and enforcement activities.

E. Conclusion

Although substantial growth is desired in the Pesticide Program over the next five years for the expansion of inspection and enforcement activities, budget restrictions will most likely cause responsibilities to exceed staffing capabilities. Sources in the Pesticide Program suggest that the excellent performance of the states in assuming responsibility for the requirements of FIFRA will help to mitigate somewhat the problems caused by anticipated understaffing.

The demobilization of the Division of Pesticides Community Studies and the closing of the Perrine Laboratory in Florida and the training center in Chamblee, Georgia have resulted in a loss of expertise and competency for the regions. Formerly, the Division of Pesticide Community Studies provided technical and laboratory assistance, technical information, training and accident investigation capability. The Perrine Laboratory trained laboratory technicians for state and federal agencies, and

the training center in Chamblee trained inspectors and state pesticide project officers. Region VI does, however, have a functional contract laboratory and three state pesticides studies contracts. Medical and epidemiological expertise is gradually diminishing and is not being replaced.

## IV. POTABLE WATER AND WASTEWATER

### A. Workforce Profile

In the majority of instances the drinking water programs of the Region VI states are well organized and equipped to assume primary enforcement responsibility under the Safe Drinking Water Act. Drinking water quality is considered to be good in most Region VI states.

Wastewater efforts within the Region are also extensive, and special emphasis has been placed on training. Pursuant to Section 208 of the Federal Water Pollution Control Act, areas and agencies are being designated across the Region VI states to identify treatment works needed for a twenty year period, the coordination mechanism and the management structure necessary for implementation. The Region VI 208 areawide planning program is more advanced than in other federal Regions.

According to "Pollution Engineering" December, 1976, Region VI has provided key personnel to serve on an advisory committee for public participation in the 208 Areawide Wastewater Management Program. It is anticipated that this approach will facilitate early involvement of local personnel from the 18 sponsoring designees, both statewide and areawide.

In the area of drinking water, more than 99 percent of all freshwater stored within the region is underground. Because surface water is visible and easily obtainable, legal procedures relative to its allocation and management have been established. Groundwater protection will require more extensive consideration.

To that end, underground injection of waste materials in aqueous or gaseous states devoid of all but the most minute solid particles must be carefully controlled. Region VI contains the majority of the country's injection wells.

The aquifers which underlie almost 80 percent of the region can be more extensively developed. The exception is the Ogallala under the High Plains which is being depleted rapidly.

The presence of subsurface reservoirs, then, impacts most Water Division programs. Not only are these reservoirs sources of fresh water, but storage of liquid wastes are also important uses of these areas. Some formations are thought to be possible geothermal sources, also.

The presence of over 2,000 offshore drilling platforms contributes a unique aspect to the areas of responsibilities delegated to water supply personnel. Many of these platforms are outside the states' territorial waters. Therefore, the EPA assumes the responsibility for drinking water supplies and other environmental controls.

Although there is some distinction between the potable water and wastewater pollution control staffs in Region VI, particularly in abatement and control functions, both these areas are contained in this section of the report since the information available to the author prohibits meaningful separation of personnel into two distinct programs.

In the EPA Region VI office, the Water Division administers all Regional Water Programs. This Division is responsible for recommending

goals, priorities, and objectives for the Regional Water Programs and for developing, coordinating, implementing, and evaluating these programs. Within the Water Division are three branches: Municipal Facilities, Water Supply, and Water Program Branches.

The Municipal Facilities Branch manages and evaluates the Regional Construction Grants and Operations and Maintenance Program for Municipal wastewater treatment systems. This branch ensures that the program is conducted in conformance with regional and national strategies and applicable laws, regulations and policy guidelines. Additionally, the Municipal Facilities Branch provides administrative and technical assistance to federal, state, interstate, regional and local agencies, consulting engineers, contractors, and applicants in the development of grant applications and continues assistance through completion of the projects. It also makes recommendations regarding Environmental Impact Statements and Issuance of Negative Declarations for municipal facilities.

The Water Supply Branch plans and implements regional and national activities to assure promulgation and compliance with PL 92-523, the Safe Drinking Water Act. To this end, the Branch must develop necessary implementation procedures and plans, provide states with financial and technical assistance to support the assumption of primary enforcement responsibility for National Primary Drinking Water Regulations and Underground Injection Control Regulations, establish an action protocol with state and local authorities for hazardous situations, develop a program for protection of sole source aquifers, implement the Interstate

Carrier Water Supply Program, update and verify the inventory of public water supplies, and provide assistance to the states in program planning, grant review and approval, and progress evaluations.

The Water Programs Branch monitors and provides program assistance to state and local agencies in the conduct of their water quality management programs. The Branch reviews, recommends approval of, and monitors state water pollution control and water supply programs developed by state and local agencies. Programs include all facets of the National Pollution Discharge Elimination System (NPDES), Water Quality Standards, Section 106 statewide and 208 areawide planning, Small Business Administration (SBA) Loan Certification, and state Water Supply and Underground Source Programs.

Contributing support to the Water Division is the Enforcement Division. This Division provides overall legal direction and implementation to the water programs, including review of applications for permits submitted pursuant to Section 10 of the Rivers and Harbors Act of 1899, as amended; Section 404 of Federal Water Pollution Control Act (FWPCA); PL 92-500; and Section 21(b) of the FWPCA, as amended. Also providing support to the Water Division is the Surveillance and Analysis Division. Surveillance, monitoring, and laboratory analytical activities are provided by this Division.

According to the FY 78-82 Preview Submission document, an important area of concern in the Water Supply Program is the availability of personnel to meet the requirements of the Safe Drinking

Water Act. Beginning June 24, 1977, Region VI will have to administer the Public Water Supply Supervision Program on at least 170 water supply systems on offshore oil drilling platforms which are located outside of state territorial waters and about 30 Indian water supply systems in New Mexico, also not under state jurisdiction. In addition, more than 100,000 injection wells are located in Region VI. This number comprises approximately 60 percent of the nation's total, and injection well systems often have numerous water supply contamination problems.

Region VI has the only aquifer determined to be a "sole source" under Section 1424(e), the Gonzales Amendment, of PL 93-523; the Edwards Underground Reservoir. This aquifer source will require groundwater assessments, Environmental Impact Statements, and other data for projects seeking federal financial assistance. In other words, determination has been made by EPA that the Edwards Reservoir, as a sole source of drinking water for about a million Texas residents, if contaminated would result in widespread health hazards. Therefore, no projects will be allowed federal assistance which in any way might cause contamination of the Edwards Underground Reservoir through its recharge zone. The Edwards Reservoir is approximately 175 miles long and 5 to 25 miles wide. This determination is of importance for several reasons, not the least of which is the fact that 40 years of intensive study have gone into the evaluation of this aquifer.

With regard to wastewater, the Construction Grants Program is the Region's largest and one of the most critical Water Programs. Accordingly, the Region VI strategy will focus upon improving the proficiency

of the overall program by strengthening the role of the states and promoting effective communication between the key groups involved in the grants process.

In the area of Wastewater Treatment Operations and Maintenance (O & M), Region VI is likely to choose a mixed approach of enforcement and technical assistance. It is thought that partial use of the enforcement approach will minimize the amount of state and federal technical assistance required and encourage local technical assistance efforts.

The primary objective in water quality planning for FY 78 will be to develop Best Management Practices for the statewide Section 208 planning (under the FWPCA) effort for control of non-point sources of pollution. Possible problem areas include initial funding of management agencies and continuation of funding to keep the Section 208 plans current. In terms of surveillance, compliance monitoring of facilities affected by water regulations will continue to be stressed. Field and laboratory effort is expected to expand considerably with the passage of the Toxic Substances Control Act.

In the Water Division approximately 107 persons are currently involved in water pollution abatement and control activities, as well as water supply activities. The following table illustrates the 1976 staffing levels of the water program. Included below are potable water and wastewater personnel.

TABLE V

WATER DIVISION

Potable Water and Wastewater Personnel
Current (1976) Staffing Level

| Position | 1976 |
|---|---|
| Administrator | 11 |
| Engineer | 37 |
| Technician | 9 |
| Clerical | 25 |
| Other | 25 |
| TOTAL | 107 |

In sum, 197 professional, technical, and clerical personnel are employed in the EPA Region VI Water Division. Personnel from other Divisions, such as Enforcement and Surveillance & Analysis, offer assistance to the Water Division. These personnel include: chemists, biologists, geologists, physical scientists, and attorneys. In Table V there are 11 persons identified in the administrator category. These personnel include the Division Chief, Branch Chiefs, and Section Chiefs. In the engineer category, the position of sanitary engineer predominates. Other types of engineers working in the water programs are environmental, civil, and chemical. The technicians include engineering technicians and environmental protection assistants. These positions generally require an associate's degree or two years of higher education. The clerical category includes secretarial and clerical persons. The category identified as other contains persons holding positions such as: grants specialist and assistant and data management clerk.

B. Workforce Projections

Staffing increases will be required in both the Water Quality and Water Supply Programs. In the Water Quality Program additional personnel will be necessary to provide support to the Section 208 areawide planning program due to the recent award of seven additional grants of which five are statewide and two are areawide. These grants carry with them increased contracts management and monitoring responsibilities for the Region VI water program staff. Furthermore, program officials anticipate a very substantial need for additional resources with final designation of hazardous substances and the subsequent promulgation of their spill prevention regulations. Program officials further indicate that an increased effort will be required to review and evaluate ambient water quality data to assess the effectiveness of ongoing programs and to determine whether discharge permits need to be reissued on water quality limited criteria. Although the Region VI workload will decrease as states accept additional delegations, reductions will be offset by increased attention to program management, quality control, procedural and program management and by an increase in the number of active projects to be administered.

Substantial staffing increases will also be required to enhance the enforcement effort for major permittees. It is likely that a significant number of dischargers will not attain compliance by July, 1977. Attention will have to be given to the more significant minor dischargers, as well. Thus, activities to be accomplished in FY 1978

include: an increased NPDES Permit enforcement program, continuation of a level of adjudicatory hearings associated with the second round of permit issuance containing BAT limitations, and NPDES delegations. Region VI will also be required to direct state implementation of pre-treatment requirements, final dredge and fill regulations, enforcement of the Safe Drinking Water Act, and anticipated hazardous and toxic substances regulations or legislation. Emphasis in enforcement of the Safe Drinking Water Act will be upon underground injection control.

As mentioned previously with regard to the Water Supply Program, Region VI staff will be required to administer the Public Water Supply Supervision Program for about 170-230 public water supply systems, administer Underground Injection Control (UIC) Supervision Programs of the states in Region VI, review groundwater assessment, EIS's and other data for the Edwards Underground Reservoir, and review and perform quality assurance audits of the development and implementation of state water supply regulations pursuant to the Safe Drinking Water Act, PL 92-523.

It should be noted that, like the Region VI Air Program, utilizing anticipated program needs as the basis for five year workforce projections would tend to overestimate the increase in the Water Programs workforce that actually will be authorized. Based on the best professional judgement of Water Program officials, the following table depicts estimations of the projected workforce to 1982.

TABLE VI

WATER DIVISION

Potable Water and Wastewater Personnel
Workforce Projections to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum growth (average) |
|---|---|---|---|---|---|---|---|
| Administrator | 11 | 11 | 11 | 11 | 11 | 11 | 0% |
| Engineer | 37 | 41 | 45 | 49 | 54 | 59 | 10% |
| Technician | 9 | 9 | 9 | 9 | 9 | 9 | 0% |
| Clerical | 25 | 26 | 27 | 28 | 29 | 30 | 4% |
| Other | 25 | 26 | 27 | 28 | 29 | 30 | 4% |
| TOTAL | 107 | 113 | 119 | 125 | 132 | 139 | 5% |

Increases in the Water Division will be allocated mostly to the Water Supply Program in the areas of underground injection control and enforcement and technical assistance in water supply supervision programs of Indian reservations and offshore drilling platforms. Other increases will be for laboratory personnel to carry out responsibilities emerging under the Toxic Substances Control Act. Some staffing increases will be allocated to the Water Quality Program, particularly for 208 planning, but since this program received a larger share of increases in the past, growth here is likely to be subordinated to growth in the Water Supply Program.

C. Training and Certification

A Water Supply Training Program has been developed and is utilized by Branch personnel for new employees. It is designed to present an orientation and background regarding the Water Supply Branch, and to provide specific information regarding underground injection and evaluation

of public water supplies. Informal sessions are scheduled with flexibility allowed, and conducted by senior staff persons. The sessions may include films, slide-tape presentations, field trips and discussions. For new entrants extensive familiarity with the regulations of the Safe Drinking Water Act is of primary importance.

Upgrade training may include attendance at either EPA or Civil Service courses. Since direct Potable Water training has essentially been discontinued by EPA, professional staff persons are encouraged to attend at least one professional meeting per year as a substitute. For example, courses and conferences conducted by the American Water Works Association may be attended and utilized for upgrade purposes. EPA Technology Transfer also presents excellent courses.

Training of state and local Water Supply personnel by the Branch has taken the form of technical assistance due to federal policy limitations. This type of assistance has proven effective in upgrading the skills, but the number of persons assisted annually is limited. To enhance the skills of state and local personnel, and to address the greatest number of people possible, predicated upon available funds, EPA Headquarters, in cooperation with the Regional Offices, is developing training plans and programs.

Because of the difficulty in arranging direct training, most efforts proposed will be in the area of curriculum development. EPA will award grants for courses to be packaged, and the direct training for the most part will come from state regulatory agencies, community colleges, and state operator associations. It is believed that many states will be able to utilize these courses within the framework of existing programs.

Water Supply Training plans are more advanced than plans for Underground Injection. Current Water Supply training plans include:

- Grants will be awarded to the American Water Works Association to develop a series of manuals for local officials and a basic operator training course.
- A grant will be awarded to the Conference of State Sanitary Engineers to collate all existing training materials.
- The EPA National Training Center will develop a short course on laboratory certification, bacteriological methods, organic chemical analysis, inorganic chemical analysis, and chlorine residuals.

Package courses for public notification, variances and exemptions are in the planning stage. A program of assistance to State Training Officers is also anticipated. An interagency agreement between EPA and the U.S. Office of Education is being developed for Water Supply training through the state vocational education systems. Finally, state rural water associations will develop training for small systems. This training program will be funded by the Farmer's Home Administration. All programs should be operational by late fiscal year 1977.

Long range plans for water supply training consist of direct conferences and seminars for EPA and state regulatory personnel. Emphasis will be on administrative procedures such as planning, grants administration, budgeting, and reporting.

Underground Injection Control (UIC) training plans are in the developmental stage. Almost all national UIC programs will emerge from Region VI as a result of specific expertise not elsewhere available. The UIC programs will equip federal and state personnel with required technical

skills to properly administer a UIC plan. A national conference is tentatively planned for EPA professionals, regarding the technical and administrative aspects of the UIC program. Another national conference for state legislators regarding implications of Underground Injection Control will follow.

Technical wastewater related training is available to employees through the EPA Laboratory at Cincinnati, Ohio. Selected professional employees upon occasion attend graduate level courses offered by local universities. EPA water pollution control personnel, however, will require training in the areas of toxic substances and new and unique wastewater treatment processes and procedures. However, technical training is needed in almost every program area. Lack of available training funds is the usual hindrance to such activities.

Short courses for wastewater personnel in the states are sponsored by the Manpower Office. These courses relate to all aspects of wastewater treatment technology, as well as to compliance monitoring. Manpower Office personnel assist at the State Short Course Schools as well as the usual annual week long schools. Technical assistance is also available to wastewater training officers.

D. Career Potential

Career potential in the water area in Region VI will be predominantly in the engineering area, with sanitary engineers comprising the largest area of specialization. Geologists and hydrologists will also be in demand. Increased emphasis on toxic substances control will require additional laboratory personnel and, perhaps, a toxicologist.

Implementation of the Underground Injection Control Program, a priority program in Region VI, will require an increased number of scientists and engineers. Since this program is of recent origin and is undeveloped nationally, persons with knowledge of this field are scarce. For the most part, EPA has located the most nationally experienced UIC personnel in Region VI. The availability of other UIC expertise is limited. Career potential in this area will be substantial over the next three to five years. The Underground Injection Program is not well understood as yet, regionally. Training personnel, therefore, in the UIC specialized knowledge and skills will also be in demand.

Finally, planners who have an understanding of engineering feasibility and laboratory activities and contract auditors may be required for the grant activities prescribed under 208 planning.

E. Conclusion

Although growth was expected to proceed more rapidly in the Water Supply Program than in the Water Quality Program in EPA Region VI, ten new positions have been allocated for water pollution control for FY 77 and FY 78. Unlike several other EPA Regions, all the states comprising Region VI have indicated intentions to assume primary enforcement responsibility under the Safe Drinking Water Act. Region VI personnel anticipate that three of the five states will be among the first in the nation regarding assumption of primacy. When this occurs, the Regional function will stabilize to one of providing technical assistance and helping with problems concerning variances and exemptions. FY 1977 and 1978 will

require that Region VI maintain a very close relationship with the state organizations to establish appropriate capabilities at that level for assumption of primacy.

The Underground Injection Control Program is in a relatively early stage of development. Because approximately 60% of the nation's injection wells (about 100,000) are located in this area (80,000 in Texas alone) and because contamination problems have historically existed, the Underground Injection Control program is and will continue to be extremely important in Region VI. After regulations are promulgated, states will be designated for the required establishment of programs. This, too, will require close contact with and the provision of technical assistance to the state agencies in developing their UIC capabilities to accept primacy in this area.

The insufficiency of training at the federal, state, and local level may be regarded as a problem, as new regulations are promulgated which require new procedures, new and more sophisticated analyses, and previously unrequired areas of expertise. A training plan developed by the EPA Office of Water Supply in Washington, D.C. is designed to meet the needs of state, local, and to some extent, federal officials in meeting the mandates of the Act in regard to both Water Supply and Underground Injection.

As with the Air Program, responsibilities in the Water Quality Program are projected to increase at a faster rate than staffing growth. NPDES, 208 planning, and control of toxic pollutants will all require increased staffing. The probability exists, however, that those resources will not be sufficient to adequately staff these expanding program areas.

## V. RADIATION

### A. Workforce Profile

Region VI uses of radiation and radioactivity are proliferating. All of the states located within Region VI, with exception of Oklahoma, are "agreement" states. This term refers to an agreement between the state and the Nuclear Regulatory Commission (NRC) under which the state assumes certain of the Commission's responsibilities. This agreement is entered into under the terms of Section 274 of the Atomic Energy Act of 1954.

Nuclear power plants are becoming a reality across the Region VI area. Increased uranium mining and milling produces tailings problems which need assessment and supervision. Nuclear wastes will increasingly be transported through several Region VI states. This will be especially true if a repository for high level nuclear wastes is developed near Carlsbad, New Mexico. Radiation and radioactivity, then, are increasing areas of environmental concern in this Region. The responsibilities increase rapidly insofar as the radiation program is concerned.

The Region VI radiation office is a component of the Air and Hazardous Materials Division, Pesticides and Hazardous Materials Branch. The major responsibility for radiation control has been assigned to the Hazardous Waste Management Section. This Section is directed to ensure that maximum protection is provided to the environment, including human health and welfare, against hazards from radiation. Thus, the Hazardous Waste Management Section develops, supports, and coordinates state programs

for radiation control and provides managerial and technical assistance to state radiation control programs. In addition, the Section conducts program assessment, planning, demonstration of new methods, monitoring, coordination of emergency episodes and special studies involving radioactivity.

Located in Region VI are a large number of diverse nuclear and radiological operations, planned and existing, including nuclear and research reactors, uranium mines and mills, nuclear fuel fabrication, and nuclear waste disposal sites. Regional staff conducts EIS reviews, provides assistance to states, and carries out site visits, environmental surveys, and special studies for these operations. Moreover, the staff provides assistance to states in their State Radiological Response Plans, coordination and implementation of radiological aspects of the FWPCA, NPDES, and Safe Drinking Water Act, non-ionizing electromagnetic radiation, and regional training acitivites. Finally, it is desirable for the staff to maintain a continuing awareness of natural radioactivity sources such as radium in groundwater and radium, thorium, and uranium in the phosphate, pumice, and other mining activities of the Region.

Currently, the staff of the radiation control office is limited to one person, a radiation control specialist.

B. Workforce Projections

As the energy shortage continues, it is anticipated that nuclear power operations will be on the increase. Of the country's total hazardous wastes 25% to 30% are, at present, located in Region VI, mostly in Texas.

Mining and milling activities are proliferating, particularly of uranium resources in New Mexico. As a consequence, the office anticipates the addition of three radiation personnel in 1978 and one individual each year thereafter to 1982. Staffing projections are depicted in the table below and represent the best professional estimates of Region VI personnel.

TABLE VII

AIR AND HAZARDOUS MATERIALS DIVISION

Pesticides and Hazardous Materials Branch
Hazardous Waste Management Section
Workforce Projections to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum growth (average) |
|---|---|---|---|---|---|---|---|
| Engineer | 0 | 0 | 1 | 2 | 2 | 2 | N/A |
| Scientist | 1 | 1 | 2 | 2 | 2 | 3 | N/A |
| Technician | 0 | 0 | 1 | 1 | 2 | 2 | N/A |
| TOTAL | 1 | 1 | 4 | 5 | 6 | 7 | N/A |

By 1981, the radiation control program is projected to be staffed with a total of seven professional and technical personnel. Professions may include health physicists, environmental scientists, radiochemists, and nuclear and environmental engineers. Percent average per annum growth is not calculated since the small size of the base would tend to inflate the result.

Additional staff will be required not only as a result of the anticipated growth in nuclear facilities and expanded mining and milling operations, but capability is also necessary for the increased emphasis in the area of natural radioactivity and for assistance in developing State Emergency Response Plans. With the implementation of the Safe Drinking

Water Radiation Standards, Region VI will be called upon for increased technical assistance. Limited activity in radiation control has taken place within the Enforcement Division, and little increase is expected here, since much of this type of activity is handled by the Nuclear Regulatory Commission.

C. Training and Certification

Training in Region VI exists on an extremely limited basis in the field of radiation control. For the most part, the Nuclear Regulatory Commission (NRC) is responsible for the majority of applicable courses. Regional radiation personnel are allowed to attend NRC training seminars and courses when time and budgetary constraints prohibitory.

Local universities present scientific and engineering courses often in the required radiation discipline. EPA regional personnel are encouraged to continue postgraduate training when it is available.

D. Career Potential

Job opportunities in the Regional Office are limited. It is expected that no more than six openings will develop over the next five years. Some of these jobs will be for highly trained individuals with engineering and science backgrounds (physics, radiation) and some will be for technicians with radiological training. Primary responsibility for control and abatement of radiation pollution will become increasingly a state and local function. Accordingly, it will be at these levels where positions emerge as the use of radiation and disposal of radioactive materials increases.

Considerable training in the sciences and instrumentation will be necessary, although a four year or advanced degree will not be a requirement for many jobs. Further, job openings for individuals in health and allied professions, with emphasis in radiation areas, will become a growing career option. The determinant of career potentials in the radiation fields will be the amount of emphasis placed on using radiation and radioactive materials in the future.

E. Conclusion

The regional radiation effort is currently low, and this effort is not expected to be increased substantially over the next five years. The primary function of the program is regulatory, with technical assistance provided on an as needed basis. Resource limitations have served to constrain regional radiation control activities. In the future, increased emphasis will be placed on EIS review, environmental monitoring, and State Radiological Emergency Response Plans as the use of radioactive materials proliferates. Staff growth in the Region VI radiation office will be somewhat limited, private sector career opportunities probably will show a rapid expansion. State level programs will also experience expansion.

## VI. SOLID WASTE

### A. Workforce Profile

The problems related to solid waste management in Region VI run the gamut from extensive and almost unmanageable to exceedingly well controlled. Climatological uniqueness contributes substantially to problems in the Region. Availability of land in Louisiana is a major problem.

An important need of the solid waste management program is for increased educational efforts relative to the public. Solid waste remains a low public priority area. Training is desparately needed. Herein lies a major environmental challenge for the Region VI EPA personnel.

Present responsibility for the environmental area of solid waste management has been allocated to the Air and Hazardous Waste Management Section. This Section develops, supports, and coordinates state programs for toxic substances and hazardous waste management, as well as for radiation control.

According to the FY 1977 Regional Operating Guidance document, the Regional role for solid waste management for FY 1977 is to develop state programs capable of implementing state control over all land disposal sites where any type of waste, with the exception of radioactive, is disposed, initiating the hazardous waste control programs, stimulating resource conservation and recovery, and source reduction, and utilizing land use planning procedures in the siting of solid waste management facilities.

A draft of the Regional Operating Guidance document for FY 1978 indicates that the scope of solid waste management activities will expand significantly as a result of the Resource Conservation and Recovery Act (RCRA) of 1976. This Act provides the mechanism for establishing strong federal regulatory programs for residual management by including the following factors:

- Redefining solid waste to include waste sludges, liquids, and contained gases from industrial, commercial, mining, and agricultural operations;
- Requiring control over the storage, treatment and land disposal of hazardous wastes;
- Requiring the gradual phase out of open dumps and the institution of environmentally-sound land disposal and/or resource recovery systems for solid waste.

Under the RCRA, the state is viewed as the principal agent for control of health and environmental problems resulting from improper solid waste management practices and as the force for encouraging increased conservation and resource recovery. EPA's objectives, then, are to provide technical and financial support to maximize state assumption of responsibilities under the Act.

The Region VI solid waste pollution control program is currently staffed by two professional persons, a section chief and a biologist.

B. Workforce Projections

As a result of the RCRA, technical assistance will be expanded to the state and local level and additional assistance will be required for federal facilities to meet the guidelines of the Act. Lists of hazardous

waste disposal sites must be developed, and types of wastes must be identified, as well as current methods of disposal. Resource recovery and land disposal sites also must be inventoried.

Federal facilities will become demonstration areas for reducing the amount of waste generated and for implementing resource recovery. Effective methods are to be applied on a broad scale. This will require assistance from Region VI. Similar assistance will also be provided to industries.

A hazardous waste permitting program will be implemented under Subtitle "C", and states will have the opportunity to administer their own programs after having demonstrated the capability to do so. Technical assistance will, again, be required if states fail to accept primacy in this regard, EPA will be responsible for the entire program implementation.

Likewise, under Subtitle "D" of the Act, states may develop Discarded Materials Plans. The Plans will prohibit establishment of open dumps, will close or upgrade existing open dumps, and will provide for resource conservation or recovery and for the disposal of discarded materials in an environmentally sound manner. Technical assistance will be provided to the states, or, if they do not assume primacy for the open dump inventory, the EPA regional office will become responsible.

The following table depicts workforce projections for the Region VI solid waste management personnel to 1982. Projections represent the best professional estimates of program officials.

TABLE VIII

AIR AND HAZARDOUS MATERIALS DIVISION

Pesticides and Hazardous Materials Branch
Hazardous Waste Management Section
Solid Waste Personnel
Workforce Projections to 1982 (est.)

| Position | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | %/annum growth (average) |
|---|---|---|---|---|---|---|---|
| Engineer | 0 | 1 | 2 | 3 | 3 | 3 | N/A |
| Scientist | 1 | 1 | 1 | 2 | 2 | 2 | N/A |
| Other | 1 | 1 | 1 | 1 | 1 | 1 | N/A |
| TOTAL | 2 | 3 | 4 | 6 | 6 | 6 | N/A |

At full program staffing, the workforce is projected to total six persons, five professional and one secretarial. The professional staffing increases will include engineers (chemical or industrial) or a geologist. Besides the small amount of staffing growth shown in the table, additional personnel may be required in the areas of hazardous wastes and resource recovery. An important determinant in this regard will be the initiative of the states in developing and implementing their own programs. Another uncertainty is whether the majority of enforcement activities will occur at the regional level or at headquarters.

C. Training and Certification

The present Region VI workforce in this environemntal area is exceedingly interested in training. There is little training and virtually no certification. Every effort is being made to encourage Texas A & M to

establish a training center. This would be a unique situation for the western states. Solid waste training is ranked rather low within the federal dollar priorities, yet is felt to be extremely important, especially to Region VI, as hazardous wastes become an increasingly serious problem area.

On-the-job training for new entrants takes place on an informal basis. During the orientation period, new staff members are supervised by experienced personnel. Upgrade opportunities are available from EPA, the Civil Service Commission, and professional association meetings. Civil Service courses, basically in the area of management, are the main source of available training. A need does exist for professional training in technical areas. Training is critical to these personnel, as new research and federal policies are subject to revision. The states, in turn, must be kept current through technical assistance.

To date, there has been very little training available to solid waste management personnel. Regional staff members attend professional meetings and occasional seminars when travel and time restrictions permit such activities.

Universities have not emphasized solid waste training. With the advent of new federal legislation, however, this may change. Should certification become an available option within the solid waste field, community colleges and vocational technical institutions might be encouraged to expand or initiate training options.

D. Career Potential

No new or unique careers are expected to emerge within the solid waste management field within the next five years, and engineers

and specialists will continue to dominate. Mechanical engineers will probably be needed for resource recovery activities, and chemical engineers will be utilized for hazardous wastes. Specialists come from science backgrounds, but emphasis for recruitment is likely to be placed upon experience in the field. Specialists with experience in the fields of hazardous waste management, resource recovery, municipal waste management, and industrial wastes will be particularly strong candidates for jobs in this field. For a new entrant, an economic and legal background would be extremely helpful.

E. Conclusion

Staffing increases will be required in Region VI primarily as a result of the Resource Conservation and Recovery Act of 1976. However, projected staffing increases do not appear sufficient to adequately carry out the expanded workload that is certain to accompany the implementation of this Act. It should be noted that specific projections are difficult to make at this time since passage of the Act is so recent, and many decisions have yet to be made at higher levels.

It is certain that technical assistance to the states will increase over the next several years, and a lack of sufficient training for program staff and state personnel could pose problems. Region VI officials indicate that a serious need exists for advanced training in solid waste and hazardous waste management and are hoping that much of this need can be met through the creation of an appropriate training program at Texas A & M University.

VII. ENERGY

A. Workforce Profile

"Energy is the strategic natural resource. Without energy, man would be at the mercy of his environment, his cities uninhabitable, and many of the material goods he now uses unavailable."[1] Overall, Region VI is composed of five energy rich, energy producing states.

Texas is a leading energy resource state. Texas has led the nation for the last 40 years in mineral output value and ranks first in output of petroleum (crude), natural gas, natural gas liquids, and carbon black. New Mexico's plentiful supply of energy ranks the state as a leading producer of oil, natural gas, uranium and coal. New Mexico ranks first in the nation in uranium production and reserves. The state is the fourth largest producer of natural gas and ranks fifth in reserves nationally. The San Juan Basin contains the fourth largest natural gas field in the world. Currently (1976) the state exports 90% of its natural gas and 66% of its electricity.

Oklahoma ranks third among states as an energy producer, but to offset this, the state is a major consumer of those energy products currently in short supply. At present the state produces more oil and gas than it consumes. The question of how long the state may continue to be an exporter is of growing concern.

Numerous energy companies are exploring possibilities of developing the vast lignite resources of the State of Arkansas. There are many

---

[1]Energy Resources Board, A State Energy Plan for New Mexico - Issues and Alternatives, Santa Fe, New Mexico, January 1977, page v.

pollution control aspects to be considered prior to the development of these resources, however. Land reclamation is an uppermost consideration in maintaining the ecological balance of the state.

Louisiana is also an energy producing state, and vast mineral reserves play a major role in the state's economy. Louisiana ranks second only to Texas in value of minerals produced, due, for the most part, to oil and gas reserves. Louisiana produces 25% of U.S. petroleum and is the third largest refiner of petroleum products. The state produces 33% of the U.S. natural gas, nearly 50% of the U.S. sulfer and is a major manufacturer of petrochemicals. Louisiana has begun exploration of lignite reserves located in and around the De Soto and Sabine parishes.

Energy resources, then, are vast and varied in source within Region VI. With energy resource development activities ongoing in the region to such an extensive degree, environmental pollution control and abatement problems become more numerous and complicated with each passing day.

The Region VI EPA office, however, has no specific division or office with allocated energy responsibilities. The concept of establishing an energy office or an office of energy activities has received a great deal of attention within and without the agency. The extensive nature of the energy resource development activities within the region appears to have precluded hasty establishment of a centralized area of responsibility.

Within the EPA Region VI agency, there is one professional who informally has been identified as the energy coordinator. This is an informal arrangement, and primarily a staff function, at this time.

B. Workforce Projections

Since there is no energy related workforce formally charged with identifiable responsibilities in this area, any addition or initial establishment of an office would constitute growth of sorts.

Within the next two years it is inconceivable that the region will not have established an officially designated staff. At least six full-time professionals with full-time secretarial support would be required to staff an office charged with this type of responsibility.

C. Training and Certification

As there is no formally identified energy staff, training in this area is nonexistent, at least within the confines of the region. Pursuant to their individual requirements and identified responsibilities, the states within the Region VI all have activities ongoing in the area of education. For the most part, the states have established energy offices within the last one to four years. Of necessity, energy budgets do not include adequate funds for training, however. One characteristic which each state energy office shares is an expressed concern regarding the education of the public as to increased conservation efforts. To this end, almost all of the Region VI states conduct public awareness and informational seminars and workshops. A number of the state energy offices are conducting assessments within their own governmental structure to identify energy related practices which involve excessive energy usage.

Utilization of new methods of energy involving renewable resources are also ongoing. New Mexico presents one example at the state level.

The New Mexico State University has been involved in solar energy research for the last 25 years. Today, on the campus in Las Cruces, the state Department of Agriculture is housed in the world's first large building designed from conception to be solar heated and cooled. The building is approximately 25,500 square feet in area, while the collectors are 6,730 square feet (29% of the office and laboratory area). This example of solar energy use was funded through the U.S. Energy Research and Development Administration (ERDA), the New Mexico State University, and the New Mexico Energy Research and Development Fund.

Training for energy staff members, is available through the universities and colleges of the various states. Specifically, upgrade and postgraduate courses are available in the sciences and engineering areas. At present, there is no certification relative to this program area.

Overall then, training efforts are specifically directed toward the public and concentrate on conservation. In order to inform the citizenry, program guides for commercial buildings, transportation, residential buildings, and industry are being developed. Currently, several states are developing an Energy Education Program for use by the state educational system. Workshops and other means of public information are also part of this program.

D. Career Potential

Currently, opportunities at the federal level are limited; however, should a Region VI Office of Energy Activities or Energy Office be established, more career options would be available. Engineers, at least on the degreed level and preferably higher, would be in demand.

This would be even more apparent were the professional to have certain energy-related expertise and a firm background inclusive of the regional uniqueness which contributes substantially to the pollution control and abatement problems of the area.

Extensive energy development projects are proposed for the states of Region VI. These projects have been identified by the Bureau of Mines and are specifically discussed in the various state reports. The establishment of new projects, as well as the extension or upgrading of current projects, will impact the environmental workforce profiles. For example, in New Mexico, the Arizona Public Service Company has installed and will continue to install environmental equipment and modifications at the Four Corners Power Plant. These additions and/or modifications will require specialized personnel.

Therefore, these career opportunities will be available, but training and educational qualifications will be stringently examined. Environmental pollution control and abatement devices are exceedingly costly and, as such, are not left to the unskilled and/or untrained worker.

E. Conclusion

Extensive energy-related activities are currently ongoing within the states of EPA's Region VI. As such, new environmentally related problem areas arise on an almost continuous basis. Adding to their concerns will be the establishment of a number of fuels-related projects scheduled for the states.

Extensive energy resource development in Texas and the other Region VI states is accompanied by environmental concerns. With the advent of nuclear power and increased mining and milling activities, the workforce profile to 1982 and beyond assumes new dimension. Career potentials will abound over the next five to ten years, at least at the state level within Region VI.

From the foregoing it appears that an office of energy activities/ affairs within the Dallas EPA Region structure will probably be established. The extractive efforts, as well as the conversion activities across the region, result in problems as well as solution. If the Environmental Protection Agency is to continue its protective efforts regarding the citizenry and the environment in which we live, some officially designated person or persons, beyond simply a coordinator, should be identified officially as the responsible EPA liaison with the states and the private sector. Far too much time has elapsed with the described status continuing to be devoid of designated energy personnel in the EPA Region VI structure.

Issues currently being addressed by the states include:

- Taxation of energy materials by the states;
- The establishment of energy processing plants in the states;
- The siting of energy developments across the Region; and
- The role of energy conservation in the states.

To alleviate the increasing environmental concerns on the part of the citizens, energy development and environmental protection can be demonstrated as harmonious endeavors when planning is utilized.

Establishing an energy office staffed with personnel having energy-related areas of expertise may well be a step in the direction of this required planning.

The future workforce for this field will require training in specialized areas. The states, while desirous of protecting the quality of their environment, will proceed with energy resource development plans which will contribute to their energy independence. The future of Region VI will present challenges to the energy conservation and conversion fields, as well as to the resource development sector. New careers may well emerge from these energy-related activities.

## SUMMARY

The Region VI EPA office has expressed the need for some workforce expansion over the next five years. Growth will vary depending on the particular program area and on the level of funding. New program responsibilities are emerging, particularly in toxic substances and resource recovery in the last year, and will require significant staff growth or re-examination of program priorities.

The current national examination of a broad range of energy issues will focus in part on Region VI. Texas, Louisiana, and Oklahoma, all located in Region VI rank first, second and third in petroleum and natural gas resources. The production, allocation and conservation of these resources are serious concerns which must involve the EPA regional office.

The Region VI Air Program has been understaffed in the past, and projections are that the staff of 56 will increase only by 4% to 5% per year through 1981. New Branch responsibilities and potential major amendments to the 1970 Clean Air Act could portend staff shortages or program prioritizations. Noise programs for Region VI are administered by the Air Program Branch, and the allocation of one staff member to this effort reflects the relatively lower priority and responsibilities of noise control programs. Noise is an area of potential change, but growth is either not expected or is very speculative.

The full force of the 1972 FIFRA Amendments is begining to make itself felt in Region VI EPA offices, much as it is in other parts of the country. A growth rate of approximately 4% per year is expected in the Pesticides Program, although there are serious doubts as to whether this will provide a staff sufficient to meet responsibilities imposed. Providing technical

assistance to and supervision of state programs will become an increasingly larger role.

Persons employed by the Region VI Water Division handle a unique variety of potable water and wastewater programs; included among these is direct EPA supervision over some Gulf of Mexico territorial waters. While staff expansion is expected to be only 5% per year, the Division will be forced to assume expanded roles in Section 208 planning, the Safe Drinking Water Act, underground injection control, and other emerging programs.

The radiation effort in Region VI is currently composed of one person. Expansion to seven professionals in various fields is expected because of the anticipation of more nuclear power facilities and greater uranium operations, particularly in New Mexico. Solid waste is another area in which minimal growth may not be adequate for future responsibilities. Hazardous waste problems and provision of technical assistance under the RCRA probably cannot be fully assumed by a projected staff of six persons; there is a solid waste staff of two at the present time.

As noted previously, energy is a dominant factor in Region VI; since the EPA office has no formal energy responsibility, this is likely to be a topic of much future discussion. The present uncertainty and reorganizational prospects in the federal energy field make any projections in this area extremely difficult.

Diminishing financial and workforce resources have seriously limited training programs, especially for state and local personnel. Attendance at Research Triangle Park and Cincinnati training sessions is still possible for federal personnel but is becoming increasingly rare for state environmental staffs. Technical assistance by regional EPA personnel is

often too infrequent and too informal yet it is all that is available in many cases. Efforts to incorporate some training into formal educational institutions have been initiated.

Few new careers will be developing in Region VI EPA. The growth and the minimal expansion that is expected will be for highly-trained persons. Engineers, natural scientists, and technicians seem to be the most likely areas of career development. Energy, hazardous wastes, resource recovery, and radiation in the nuclear power field represent areas of increasing program emphasis over the next five years.

# Bibliography

## Articles and Periodicals


Ardill, John. "Controlling Water From Source to Tap - A New National Strategy," Water and Sewage Works, CXX, No. 1 (January, 1973), p. 56.

Berman, Fred. "Conserving the Future: America's Scrap Processing Industry," Phoenix Quarterly, IV, No. 4 (1973), p. 3.

Billings, Leon G. "The New Water Pollution Control Law," Plant Engineering, XXVII, No. 2 (January 25, 1973), p. 109.

Bragdon, Clifford R. "Municipal Noise Ordinances - 1976," Sound and Vibration (December, 1976), pp. 22-27.

Bureau of National Affairs. Environment Reporter. I-VII. Washington, D.C.: 1977.

Burton, Ian. "The Quality of Environment: A Review," Geographical Review, L, No. 3 (July, 1968), p. 472.

"Chemical Waste Swapping: Promising, but no panacea," Chemical Engineering (July 5, 1976).

Cook, Raymond L. "A New Era in Operation and Maintenance of Wastewater Treatment Plants," Georgia Operator, X, No. 2 (Fall, 1972), p. 12.

Courchaine, C. "A Practical Method for the Sanitarian's Review of Design of Small Public Water-Supply Systems," Ground Water, XI, No. 1 (January-February, 1973), p. 32.

Dajani, Jarir S., et al. "Optimal Designing of Urban Wastewater Collection Networks," Journal of the Sanitary Engineering Division, XCVIII, SA6 (December, 1972), p. 853.

Dean, T. A. "Calculating OSHA Noise Compliance," Pollution Engineering, V, No. 1 (January, 1973), p. 43.

Dryden, S. L. and Judd, S. H. "Think 'Quiet' From Initial Design to Plant Operation," Oil and Gas, MCMLXXI, No. 8 (February 19, 1973), p. 102.

"Electric Power and Clean Air - Can We Have Both?," Tennessee Valley Perspective, III, No. 4 (Summer, 1973), pp. 18-22.

"EPA Annual Report," Pollution Engineering Magazine, VII, No. 12 (December, 1975), pp. 34-65.

Ganotis, Chris G. and Hopper, Richard E. "The Resource Recovery Industry," Environmental Science and Technology, X (May, 1976), p. 425.

Haag, Fred G. "State Noise Restrictions - 1976," Sound and Vibration (December, 1976), p. 27.

Hale, Samuel, Jr. "Solid Waste Management - Closing the Circle," Secondary Raw Materials, X, No. 12 (December, 1972), p. 86.

Hamilton, William S. "Practical Noise Abatement for a General Aviation Airport," Sound and Vibration (February, 1977), pp. 24-27.

Higdon, Ralph E. "Understanding Reverse Osmosis," American City, XII, No. 87 (December, 1972), p. 55.

Hochheiser, Robert M. "How to Control Noise," Plant Engineering, XXVI, No. 20 (October 5, 1972), p. 90.

Hollowell, Craig D. and McLaughlin, Ralph D. "Instrumentation For Air Pollution Monitoring," Environmental Science and Technology, VII, No. 11 (November, 1973), p. 1011.

Kenaga, Eugene E. "Guidelines for Environmental Study of Pesticides: Determination of Bioconcentration Potential," Residue Reviews, XLIV (1972), p. 73.

Khan, A. N. and Siddiqi, R. H. "Treatment of Waste Water By Biological Discs," Indian Journal of Environmental Health, IV, No. 14 (October, 1972), p. 289.

Koczkur, Eugene, et al. "Noise Monitoring and a Sociological Survey of the City of Toronto," Air Pollution Control Association Journal, XXIII, No. 2 (February, 1973), p. 105.

Larsen, Ralph I. "An Air Quality Data Analysis System for Interrelating Effects, Standards, and Needed Source Reductions," Air Pollution Control Agency Journal, XXIII, No. 11 (November, 1973), p. 933.

Levy, Steven J. "Pyrolysis of Municipal Solid Waste," Waste Age (October, 1974).

Lingle, Stephen A. "Paper Recycling in the United States," Waste Age (November, 1974).

Meyers, Sheldon. "EPA and Municipal Resource Recovery," NCRR Bulletin, VI, No. 3 (Summer, 1976).

Miller, E. F. "Desalting as a Source of Water Supply," American Water Works Association Journal, LXIV, No. 12 (December, 1972) p. 804.

Miller, Stanton S. "The Business of Air Pollution Control," Environmental Science and Technology, VII, No. 11 (November, 1973), p. 988.

National Center for Resource Recovery. NCRR Update Monthly. VI, No. 2. Washington, D.C.: February, 1977.

Neal, Lawrence A. and Hervig, Roy A. "Mathematical Water Quality Models," Georgia Operator, X, No. 2 (Fall, 1972), p. 21.

O'Keefe, Andrew E. / "The Old, the New, and the Future in Air Pollution Instruments," Clean Air, VII, No. 3 (August, 1973) p. 50.

Parken, Gene F. and Dague, Richard R. "Optimal Design of Wastewater Treatment Systems by Enumeration," Journal of the Sanitary Engineering Division, XCVIII, SA6 (December, 1972), p. 833.

Peterson, Bob. "There's Gold in Your Garbage," Scouting, LXII, No. 7 (October, 1974), pp. 46-48, 84-86.

Ruckelshaus, William D. "Solid Waste Management: An Overview," Public Management (October, 1972).

Rylander, R., et al. "Sonic Boom Effects on Sleep - A Field Experiment on Military and Civilian Populations," Journal of Sound and Vibration, XXIV, No. 1 (1972), p. 41.

"Selected Manufacturers of Equipment to Control Liquid and Solid Hazardous and Toxic Wastes," Pollution Engineering (April, 1976).

Sharpe, Dr. Lois. "What the People Want You to Do with Solid Waste," APWA Reporter, XL, No. 1 (January, 1973), pp. 8-9.

Shippee, Edgar G. "Materials For Noise Absorption," Pollution Engineering, V, No. 1 (January, 1973), p. 37.

Shuster, Kenneth A. "Fuel Conservation in Solid Waste Management," Virginia Town and Country (December, 1974).

Smith, Philip W. "TVA: Making Peace in the Tennessee Valley," The South (May-June, 1976).

Solid Waste Systems. No. 5. Los Angeles: Systems Publishing, Inc.. October-November, 1976.

Souci, Gary. "Solid Waste: The New Apocalypse," Audubon, LXXV, No. 1 (January, 1973), p. 114.

Studeny, John. "Waste Paper Recycling: Issues and Answers, Part I," Printing Magazine (December, 1972), p. 50.

Terango, Larry. "The Environmentalists' Concern With Noise-Induced Hearing Loss," Journal of Environmental Health, XXXV, No. 4 (January-February, 1973), p. 350.

Train, Russell E. "The Uses and Abuses of Waste," Compost Science - Journal of Waste Recycling, XVI, No. 3 (May-June, 1975).

"U.S. Finds a Rich Resource: The Nation's Trash Pile," U.S. News & World Report (May 13, 1974), pp. 63-66.

Van Buskirk, R. B. "Can We Get Out of the Pesticide 'Jungle'?," Farm Chemicals and Croplife, CXXXV, No. 12 (December, 1972), p. 42.

Voegtle, John A. and Vilin, Frank J. "A New Concept for Operator Wages," Water Pollution Control Federation Journal, XLV, No. 2 (February, 1973), p. 203.

Walker, Thomas. "Recycling and Solid Waste Management: Economic Compatibility," Secondary Raw Materials, X, No. 12, (December, 1972), p. 88.

Waroff, Deborah. "Recycled Paper," Architectural Design, XLII, No. 11 (1972), p. 673.

Wood, Frank O. "Selecting Softening Process," American Water Works Association Journal, LXIV, No. 12 (December, 1972), p. 820.

Yerges, Lyle F. "Turn the Noise Down," Oil and Gas, LXXI, No. 2 (January 8, 1973), p. 109.

Zaporozec, Alexander. "Groundwater Zoning in Water Resource Management," Water Resources B, VIII, No. 6 (December, 1972), p. 1137.

Books

A Work Force for Environment and Energy, A Master Plan for Environmental/Energy Higher Education in Illinois. Springfield, Illinois: For the Illinois Board of Higher Education, 1975.

Anthrop, Donald F. Noise Pollution. Lexington, Mass.: Lexington Books, 1973.

Astmann, Robert C. (ed.). Rescuing Man's Environment: Nine Essays on Environmental Reform. Princeton, N.J.: Princeton University Council on Environmental Studies, 1972.

Bakish, Robert. Practice of Desalination. Park Ridge, N.J.: Noyes Data Corp., 1973.

Battan, L. J. The Unclean Sky. Science Study Series. New York: Doubleday Anchor, 1966.

Beatty, Rita Gray. The DDT Myth: Triumph of the Amateurs. New York: John Day Co., 1973.

Behan, R. W. and Weddle, Richard M. (eds.). Ecology, Economics, Environment. Missoula, Montana: University of Montana Press, 1971.

Bloodgood, Don E. Sewage Treatment Practice. Chicago: Scranton Publishing Co., Inc.

Bond, Richard G., et al. (eds.). Air Pollution. Cleveland: CRC Press, 1972.

Bond, Richard G. and Straub, Conrad P. (eds.). CRC Handbook of Environmental Control. Cleveland: CRC Press, 1972.

Brodine, Virginia. Air Pollution. New York: Harcourt Brace Jovanovich, 1973.

Brown, Carl, et al. Decision-Making in Water Resource Allocations. Lexington, Mass.: Lexington Books, 1973.

Carson, John Michael, et al. Community Growth and Water Resources Policy. New York: Praeger Publications, 1973.

Council of State Governments. Our Effluent Society. Lexington, Kentucky: February, 1974.

Council of State Governments. The States' Roles in Solid Waste Management - A Task Force Report. Lexington, Kentucky: April, 1973.

Cross, Frank L., Jr. Corporate Communicators' Guide for Environmental Control. Westport, Conn.: Technomic, 1973.

Cross, Frank L., Jr. and Noble, George. Handbook on Hospital Solid Waste Management. Westport, Conn.: Technomic Publications, 1973.

Cross, Frank L., Jr. Handbook on Incineration: Guide to Theory, Design, Operation, and Maintenance. Westport, Conn.: Technomic Publications, 1972.

Detwyler, Thomas R. (ed.). Man's Impact on Environment. New York: McGraw-Hill, 1971.

Dickey, John W., et al. Technology Assessment: Its Applications to the Solid Waste Management Programs of Urban Government. Lexington, Mass.: Lexington Books, 1973.

Dolgin, Erica L. and Guilbert, Thomas G. P. (eds.). Federal Environmental Law. St. Paul: West Publishing Co., 1974.

Dorfman, Robert. Models For Managing Regional Water Quality. Cambridge, Mass.: Harvard University Press, 1973.

Durrenberger, Robert W. Dictionary of Environmental Sciences. Palo Alto, Calif.: National Press Books, 1973.

Eckenfelder, W. W., Jr., and Cecil, L. K. (eds.). Applications of New Concepts in Physical-Chemical Wastewater Treatment. Elmsford, N.Y.: Pergamon Press, 1972.

Edmunds, Stahrl and Letey, John. Environmental Administration. New York: McGraw-Hill, 1973.

Educational Research Council of America. Challenges of Our Time: Technology: Promises and Problems. Boston: Allyn and Bacon, 1972.

Edwards, C.A. (ed.). Environmental Pollution by Pesticides. New York: Plenum Publications, 1973.

Environmental Information Center. The Environmental Regulations Handbook. New York: Environmental Information Center, 1973.

Fahy, Elmore R. Guide to the Packaging of Hazardous Materials and the Legal Requirements of the Regulatory System. New York: McGraw-Hill, 1973.

Fegely, Thomas, et al. Recycling: An Interdisciplinary Approach to Environmental Education. Emmaus, Pa.: Rodale, 1973.

Golueke, C. G. Composting: A Study of the Processes and Its Principles. Emmaus, Pa.: Rodale, Press, 1973.

Goodman, Charles R., et al. (eds.). Environmental Quality and Water Development. San Francisco: W. H. Freeman, 1973.

Graham, Frank, Jr. Since Silent Spring. Greenwich, Conn.: Fawcett Publications, Inc., 1970.

Gunter, John D. and Jameson, William Carl. Solid Waste Management: Economics and Operation. Monticello, Ill.: Council of Planning Librarians Exchange Bibliographies, 1973.

Hann, Roy W., Jr. Fundamental Aspects of Water Quality Management. Westport, Conn.: Technomic Publications.

Harrison, James D. Environmental Preferences: Relevant Studies for Urban Planning. Monticello, Ill.: Council of Planning Librarians Exchange Bibliographies, 1973.

Haskell, Elizabeth H. and Price, Victoria S. State Environmental Management: Case Studies of Nine States. New York: Praeger Publications, 1973.

Haveman, Robert H. and Knesse, Allen V. The Economics of Environmental Policy. New York: J. Wiley, 1973.

Hendricks, Charles W., et al. Fresh Water Pollution. New York: MSS Information Corp., 1973.

Hertzendorf, Martin S. Understanding and Controlling Air Pollution. Westport, Conn.: Science Publications, 1972.

Hesketh, Howard E. Understanding and Controlling Air Pollution. Ann Arbor, Mich.: Science Publications, 1972.

Holl, Karl. Water: Examination, Assessment, Conditioning, Chemistry, Bacteriology, Biology. Berlin, N.Y.: De Gruyter, 1972.

Izaak Walton League of America. A Citizen's Guide to Clean Water. Arlington, Va.: June, 1973.

Jukes, Thomas, et al. Effects of DDT on Man and Other Mammals. New York: MSS Information Corp., 1973.

King, Richard L. Airport Noise Pollution: A Bibliography of Its Effects on People and Property. Metuchen, N.J.: Scarecrow Press, 1973.

Klopfer, Peter H. Behavioral Aspects of Ecology. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Lee, Douglas H. K. Environmental Factors in Respiratory Disease. New York: Academic Press, 1972.

Lee, Kaiman (ed.). Bibliography of the Computer in Environmental Design. Boston: Center for Environmental Research, 1972.

Leithe, W. An Analysis of Air Pollutants. Ann Arbor, Mich.: Humphrey Science Publishers, 1970.

Leithe, Wolfgang. The Analysis of Organic Pollutants in Water and Wastewater. Ann Arbor, Mich.: Ann Arbor Scientific Publications, 1973.

Martin, Hubert (ed.). Insecticide and Fungicide Handbook for Crop Protection. Oxford, U.K.: Blackwell Scientific, 1972.

Mitchell, Ralph (ed.). Water Pollution Microbiology. New York: John Wiley and Sons, Inc., 1972.

Morell, Ben. Our Nation's Water Resources: Policies and Politics. New York: Arno Press, 1972.

National Association for Environmental Education. Selected Environmental Education Programs in North American Education. Edited by Arden L. Pratt, 1974.

National Wildlife Federation. Conservation Directory 1977. Edited by Gloria H. Decker. Washington, D.C.: The National Wildlife Federation, 1977.

New York Health Education Service. Manual of Instruction for Sewage Treatment Plant Operators. Albany: New York Health Education Service.

Newell, Frederick Haynes. Water Resources: Present and Future Uses. New York: Arno Press, 1972.

Noll, Kenneth and Duncan, Joseph (eds.). Industrial Air Pollution Control. Ann Arbor, Mich.: Ann Arbor Science Publishers, 1973.

Oliver, Henry. Irrigation and Water Resources Engineering. New York: Crane, Rusak, 1972.

Pazar, C. Air and Gas Cleanup Equipment. 2d ed. Park Ridge, N.J.: Noyes Data Corp., 1972.

Perera, Thomas and Perera, Gretchen. Louder and Louder: The Dangers of Noise Pollution. New York: E. Watts, 1973.

Pettyjohn, Wayne A. Water Quality in a Stressed Environment: Readings in Environmental Hydrology. Minneapolis: Burgess Publications, 1972.

Pursglove, L. A. and Mancy, K. H. Elements of Biological Wastewater Treatment - Overview. Unit 1, Part 1. Ann Arbor, Mich.: University of Michigan School of Public Health, 1968.

Ranney, David C. Water - Quality Management: An Analysis of Institutional Patterns. Madison: University of Wisconsin Press.

Ranney, M. W. Soundproofing Building Materials. Park Ridge, N.J.: Noyes Data Corp., 1970.

Robinson, D. W. The Relationship Between Hearing Loss and Noise Exposure. Teddington, England: National Physical Laboratory, 1973.

Rodier, Jean. Chemical and Physiochemical Analysis of Water. New York: J. Wiley, 1973.

Roelofs, Robert T., et al. (eds.). Environment and Society: A Book of Readings on Environmental Policy, Attitudes, and Values. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Russell, Helen R. Earth, the Great Recycler. Nashville, Tenn.: Nelson, 1973.

Schildhaver, Carol. Environmental Information Sources: Engineering and Industrial Applications; A Selected and Annotated Bibliography. New York: Special Libraries Association, 1972.

Scorer, Richard Segar. Pollution in the Air: Problems, Policies and Priorities. London, Boston: Routledge and Kegan Paul, 1973.

Shaw, Bill. Environmental Law, People, Pollution and Land Use. St. Paul: West Publishing Co., 1976.

Shepart, Merle (ed.). Insect Pest Management: Readings. New York: MSS Information Corp., 1973.

Sherman, Anthony C. Land and Trash: Our Wounded Land. West Haven, Conn.: Pendulum Press, 1972.

Sherod, H. Floyd (ed.). Environment Law Review. New York: Clark Boardman, 1972.

Spyer, Geoffrey. Architect and Community: Environmental Design in Urban Society. London: Owen, 1971.

Stephan, David L. and Schaffer, Robert B. Waste Treatment and Renovation Status of Process Development. Part 1. Washington, D.C.: Journal of Water Pollution Control Federation, 1970.

Stern, A. C. Air Pollution. Vol. I, II. New York: Academic Press, 1962.

Stern, A. C. (ed.). Air Pollution: A Comprehensive Treatise. Vol. I, II, III. 2d ed. New York: Academic Press, 1968.

Tennessee Energy Office. Tennessee Energy Handbook. Nashville: Tennessee Energy Office, 1975.

Texas Water Utilities Association. Manual of Wastewater Operations. Austin: Texas Water Utilities Association, 1971.

Thibeau, Charles E. Annual Directory of Environmental Information Sources. Boston: Cahners Books, 1972.

Van Tassel, Alfred J. Our Environment: The Outlook for 1980. Lexington, Mass.: Lexington Books, 1973.

Van Valkenburg, Wade (ed.). Pesticide Formulations. New York: M. Dekker, 1973.

Vivian, V. Eugene. Sourcebook for Environmental Education. St. Louis: Mosby, 1973.

Walsbott, George L. Health Effects of Environmental Pollutants. St. Louis: Mosby, 1973.

Water Pollution Control Federation. Manuals of Practice. Washington, D.C.: Water Pollution Control Federation.

Welch, Bruce L., and Welch, Annemarie S. (eds.). Physiological Effects of Noise. New York: Plenum Press, 1970.

Westberg, Karl, et al. The Chemistry of Smog. New York: MSS Information Corp., 1973.

Williamson, Samuel J. Fundamentals of Air Pollution. Reading, Mass.: Wesley Publishers, 1973.

Wilson, David Gordon. The Treatment and Management of Urban Solid Waste. Westport, Conn.: Technomic Publications, 1972.

Public Documents

Citizen's Advisory Committee on Environmental Quality. Report to the President and to the Council on Environmental Quality. Washington, D.C.: December 31, 1975.

Council on Environmental Quality, Federal Interagency Task Force. A Recommended Air Pollution Index. September, 1976.

Council on Environmental Quality. Integrated Pest Management. November, 1972.

Council on Environmental Quality. Environmental Quality. Second Annual Report. August, 1971.

Council on Environmental Quality. Environmental Quality. Fifth Annual Report. December, 1974.

Council on Environmental Quality. Environmental Quality. Sixth Annual Report. December, 1975.

Council on Environmental Quality. Environmental Quality. Seventh Annual Report. September, 1976.

Council on Environmental Quality. OCS Oil and Gas - An Environmental Assessment. April, 1974.

Council on Environmental Quality and Federal Council for Science and Technology. The Role of Ecology in the Federal Government. Washington, D.C.: December, 1974.

U.S. Department of Agriculture. Farmers' Use of Pesticides in 1971... Quantities. Agricultural Report No. 252, July, 1974.

U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service. The Pesticide Review - 1974. September, 1975.

U.S. Department of Health, Education and Welfare, Office of Environmental Education (Contract to Kirkwood Community College, Cedar Rapids, Iowa). A Curriculum Report - Integrated Pest Management. 1973.

U.S. Department of Health, Education and Welfare. Report of State and Local Radiological Health Programs. July, 1976.

U.S. Department of the Interior, Federal Water Pollution Control Administration, Great Lakes Region. Clean Water for Mid-America. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Department of the Interior, Federal Water Quality Administration. Clean Water Quality for the 1970's. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Department of the Interior, Office of Saline Water Report 779. The Economic Value of Water Quality. Washington, D.C.: U.S. Government Printing Office, January, 1972.

U.S. Department of Labor. "Employment in Nuclear Energy Activities." NEWS. June 28, 1976.

U.S. Department of Labor, Bureau of Labor Statistics. Impact of Federal Pollution Control and Abatement Expenditures on Manpower Requirements. Bulletin No. 1836, 1975.

U.S. Environmental Protection Agency, Office of Water Program Operations. A Classification System for Water and Wastewater Facilities and Personnel, Part 3 - Existing Examination Systems: A Current Status Report, prepared by the Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities. April, 1976.

U.S. Environmental Protection Agency, Office of Public Affairs. A Drop to Drink - A Report on the Quality of our Drinking Water. June, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. A Nationwide Survey of Resource Recovery Activities, by Richard E. Hopper. A Current Report on Solid Waste Management Series Publication No. 142, March, 1975.

U.S. Environmental Protection Agency, Division of Manpower Training. A Two-Year Water Quality Monitoring Curriculum, prepared by Ulster County Community College, Stone Ridge, New York. September, 1975.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. Abatement and Pollution Control Training and Educational Programs Presented by the U.S. EPA - July 1973 - June 1975. 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. About Sound. Washington, D.C.: May, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. An Accounting System for Solid Waste Shredders. A Current Report on Solid Waste Management, Series Publication No. 154, May, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. An Overview of Pesticide Applicator Certification. February, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Anaerobic Digestion of Solid Waste and Sewage Sludge to Methane. A Current Report on Solid Waste Management, Series Publication No. 159, July, 1975.

U.S. Environmental Protection Agency. Area and Agency Designation Handbook for Section 208 Area-wide Waste Treatment Management Planning. December, 1974

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Basic Issues on Solid Waste Management Affecting County Government, prepared by National Association of Counties. May, 1973.

U.S. Environmental Protection Agency. Beneficial Use of Storm Water. Washington, D.C.: U.S. Government Printing Office, January, 1973.

U.S. Environmental Protection Agency, Office of Public Affairs. Building for Clean Water. August, 1975.

U.S. Environmental Protection Agency. "Certification of Pesticide Applicators." Federal Register. Vol. 39, No. 197, October 9, 1974.

U.S. Environmental Protection Agency, Office of Legislation, Public Inquiries Branch. The Challenge of the Environment: A Primer on EPA's Statutory Authority. Washington, D.C.: December, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Clean Air and Your Car. March, 1974.

U.S. Environmental Protection Agency, Office of Public Affairs. Clean Air the Breath of Life. April, 1976.

U.S. Environmental Protection Agency, Mobile Source Pollution Control Office. Control Strategies for In-Use Vehicles. Washington, D.C.: December, 1972.

U.S. Environmental Protection Agency, Water Planning Division. Cost Analysis Handbook for Section 208 Areawide Waste Treatment Management Planning Federal Assistance Applications. May, 1975.

U.S. Environmental Protection Agency. DDT - A Review of Scientific and Economic Aspects of the Decision to Ban its Use as a Pesticide. July, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Mangement Programs. Decision-Makers Guide in Solid Waste Management. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Environmental Protection Agency, Office of Pesticide Programs. Digest of State Pesticide Use and Application Laws. 1977.

U.S. Environmental Protection Agency. "Effective Hazardous Waste Management (Non-radioactive) Position Statement." Federal Register. Vol. 41, No. 161, August 18, 1976.

U.S. Environmental Protection Agency, Resource Recovery Division. Energy Conservation through Improved Solid Waste Mangement, by Robert A. Lowe. Solid Waste Management Series Publication No. 125, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Energy Recovery from Waste. Solid Waste Management Series Publication No. 36d.ii, 1973.

U.S. Environmental Protection Agency. "EPA Amends Funding Formula for Areawide Planning Grants." Environmental News. October 14, 1976.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. EPA Noise Control Program - Progress to Date. May, 1976.

U.S. Environmental Protection Agency. "EPA Seeking Greater Public Involvement in Water Quality Management Programs." Environmental News. October 22, 1976.

U.S. Environmental Protection Agency. "Environmental Radiation Protection Standards for Nuclear Power Operations." Federal Register. Vol. 42, No. 9, January 13, 1977.

U.S. Environmental Protection Agency, Office of Radiation Programs, Joint Study of the Atomic Energy Commission and the Department of Health, Education and Welfare. Estimates of Ionizing Radiation Doses in the United States, 1960 - 2000. Rockville, Md.: August, 1972.

U.S. Environmental Protection Agency, Region IV, Office of Water Programs, Water Supply Branch. Evaluation of the Florida Water Supply Program. Atlanta: 1973.

U.S. Environmental Protection Agency, Office of Public Affairs. Everybody's Business - The Resource Conservation and Recovery Act of 1976. February, 1977.

U.S. Environmental Protection Agency, Office of Pesticide Programs, Office of Water and Hazardous Materials. Farmer's Pesticide Use Decisions and Attitudes on Alternate Crop Protection Method. 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Financing Solid Waste Management in Small Communities, by Eric R. Zausner. 1971.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. First Report to Congress: Resource Recovery and Source Reduction. 1974.

U.S. Environmental Protection Agency, Office of Public Affairs. First Things First. September, 1974.

U.S. Environmental Protection Agency, Office of Research and Monitoring. Full Scale Parallel Activated Sludge Process Evaluation. Washington, D.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Goals of the Federal Solid Waste Management Program, by Sheldon Meyers. 1976.

U.S. Environmental Protection Agency. "Grants to State and Designated Areawide Planning Agencies - Conditions, Policies and Procedures." Federal Register. Vol. 40, No. 230, November 28, 1975.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guide for Compiling a Comprehensive Emission Inventory. Research Triangle Park, N.C.: January, 1972.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guide to Research in Air Pollution. Research Triangle Park, N.C.: 1972.

U.S. Environmental Protection Agency. Guidelines for Areawide Waste Treatment Management Planning. August, 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Guidelines for Developing a Training Program in Noise Survey Techniques. July, 1975.

U.S. Environmental Protection Agency, Office of Water and Hazardous Materials. Guidelines for Preparation of Water Quality Management Plans. September, 1974.

U.S. Environmental Protection Agency, Office of Water Programs Operations. Guidance for Preparing a Facility Plan. May, 1975.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guidelines for Technical Services of a State Air Pollution Agency. Research Triangle Park, N.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. Guidelines to Career Development for Wastewater Treatment Plant Personnel. September, 1973.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Hazardous Wastes. Solid Waste Management Series Publication No. 138, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Hazardous Wastes and their Management. Environmental Information Series, May, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Health Effects of Air Pollutants. June, 1976.

U.S. Environmental Protection Agency. "Home Study Course on Wastewater Collection Systems." Environmental News. August 26, 1976.

U.S. Environmental Protection Agency, Office of Air and Water Programs. Improving Water Quality Management in Nonmetropolitan Areas. Washington, D.C.: January, 1973.

U.S. Environmental Protection Agency. Incentives for Recycling and Reuse of Plastics - A Summary Report. Solid Waste Management Series Publication No. 41c.1, 1973.

U.S. Environmental Protection Agency, Office of Pesticide Programs, Office of Water and Hazardous Materials. Incremental Cost Impacts of the 1972 Federal Insecticide, Fungicide and Rodenticide Act as Amended. January, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Intergovernmental Approaches to Solid Waste Management, by Richard O. Toftner and Robert M. Clark. 1971.

U.S. Environmental Protection Agency, Office of Air and Water Programs. Inventory of Interstate Carrier Water Supply Systems. Washington, D.C.: July, 1972.

U.S. Environmental Protection Agency, Water Planning Division. Interior Output Evaluation Handbook for Section 208 Areawide Waste Treatment Management Planning. June, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Mangement Programs. Land Availability, Crop Production and Fertilizer Requirements in the United States. A Current Report on Solid Waste Management, October, 1975.

U.S. Environmental Protection Agency. Management Agencies Handbook for Section 208 Areawide Waste Treatment Management. September, 1975.

U.S. Environmental Protection Agency. Management of Nonpoint Sources and District Action, by Eckhardt C. Beck. February 3, 1976.

U.S. Environmental Protection Agency. Manpower and Training Needs for Air Pollution Control. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Environmental Protection Agency, Office of Water Program Operations, Manpower Development Staff. Manpower Requirements for Wastewater Collection Systems in Cities and Towns up to 150,000 in Population. June, 1973.

U.S. Environmental Protection Agency. Markets and Technology for Recovering Energy from Solid Waste, by Steven J. Levey. Solid Waste Management Series Publication No. 130, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Market Locations for Recovered Materials. A Current Report on Solid Waste Management Series Publication No. 518, August, 1976.

U.S. Environmental Protection Agency. "Materials Recovery - Solid Waste Management Guidelines for Source Separation." Federal Register. Vol. 40, No. 181, September 17, 1975.

U.S. Environmental Protection Agency and National Institute of Municipal Law Officers. Model Community Noise Control Ordinance. September, 1975.

U.S. Environmental Protection Agency. "National Interim Primary Drinking Water Regulations." Federal Register. Vol. 40, No. 248, December 24, 1975.

U.S. Environmental Protection Agency. No Small Task: Establishing National Effluent Limitations Guidelines and Standards. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Around our House. February, 1977.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Control Programs of the Federal Government. July, 1976.

U.S. Environmental Protection Agency, Office of Noise Control and Abatement. Noise Facts Digest. Washington, D.C.: June, 1972.

U.S. Environmental Protection Agency. Noise from Heavy Construction. August, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Pollution. September, 1974.

U.S. Environmental Protection Agency. Noise Programs of Professional/Industrial Organizations, Universities and Colleges. EPA Report NTID300.9. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Environmental Protection Agency. O & M - Making Wastewater Treatment Work in Your Community. May, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Passenger Noise Environments of Enclosed Transportation Systems. June, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Pesticide Registration: How It Protects You, Your Family and the Environment. February, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Portable Air Compressor Noise Emission Standards. 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Proceedings 1975 Conference on Waste Reduction. April, 1975.

U.S. Environmental Protection Agency. Progress in the Prevention and Control of Air Pollution in 1974 - Report to Congress. 1975.

U.S. Environmental Protection Agency, Office of Radiation Programs. Radiological Quality of the Environment. May, 1976.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Railroad Noise Emission Standard. 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Recovering Resources from Solid Waste Using Wet-Processing, by David G. Arella. Solid Waste Management Series Publication No. 47d, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Recycling and the Consumer. Solid Waste Management Series Publication No. 117, 1974.

U.S. Environmental Protection Agency, Region I. Regional Administrator's Annual Report - Environmental Quality in New England. Boston: August, 1975.

U.S. Environmental Protection Agency. Relationship Between Animal Wastes and Water Quality. Washington, D.C.: EPA Publications Branch, June, 1972.

U.S. Environmental Protection Agency. "Residential, Commercial and Institutional Solid Wastes - Proposed Guidelines for Storage and Collection." Federal Register. Vol. 40, No. 134, July 11, 1975.

U.S. Environmental Protection Agency. Residential Paper Recovery: A Municipal Implementation Guide, by Penelope Hansen. 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery and Land Protection: An Environmental Imperative, by Arsen J. Darnay, Jr. 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery Plant Implementation: Guides for Municipal Officials - Financing, by Robert E. Randol. Solid Waste Management Series Publication No. 157.4, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery Plant Implementation: Guides for Municipal Officials - Further Assistance, by Denise Hawkins. Solid Waste Management Series Publication No. 157.8, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. San Diego County Demonstrates Pyrolosis of Solid Waste, by Steven J. Levy. Solid Waste Management Series Publication No. 80d.2, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Separating Paper at the Waste Source for Recycling, by Stephen Lingle. Solid Waste Management Series Publication No. 128, 1974.

U.S. Environmental Protection Agency. The Social Impact of Noise. EPA Report NTID300.11. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Environmental Protection Agency, Office of Public Affairs, Public Inquiries Branch. Solid Waste Management: A List of Available Literature. Washington, D.C.: January, 1972.

U.S. Environmental Protection Agency. Solid Waste Management: Abstracts from the Literature, 1968. EPA Report SW-66.4c. Washington, D.C.: U.S. Government Printing Office, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Solid Waste Management: Available Information Materials. Washington, D.C.: November, 1975.

U.S. Environmental Protection Agency. "Solid Waste Management - Guidelines for Beverage Containers." Federal Register. Vol. 40, No. 220, November 13, 1975.

U.S. Environmental Protection Agency, Office of Pesticide Programs. Standards for Certification of Pesticide Applicators. October, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. State and Municipal Noise Control Activities 1973 - 1974. January, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. State Program Implementation Guide: Hazardous Waste Transportation Control. A Current Report on Solid Waste Management, Series Publication No. 512, March, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. State Solid Waste Management Agencies. March, 1976.

U.S. Environmental Protection Agency. Study of Manpower Needs for Implementation of the Water Pollution Control Act Amendments of 1972 - Report No. 1: Estimate of State Water Pollution Control Agency Manpower Needs. November, 1975.

U.S. Environmental Protection Agency. Study of Manpower Needs for Implementation of the Water Pollution Control Act Amendments of 1972 - Report No. 2. November, 1975.

U.S. Environmental Protection Agency, Library Systems Branch. Summaries of Foreigh Governments Environmental Reports. Washington, D.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Summaries of Solid Waste Intramural Research and Development Projects, by Andrew W. Breidenbach. 1971

U.S. Environmental Protection Agency, Office of Water Programs. Surface Pollution Problems in the United States. Washington, D.C.: May, 1972.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. The Benefit-Cost Relationship in Entry Job Training in Water Distribution. September, 1973.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. The Demonstration of Systems for Recovering Materials and Energy from Solid Waste, by John H. Skinner. 1974.

U.S. Environmental Protection Agency, Office of Research and Monitoring. The Quality of Life Concept - An Anthology from 1972 EPA Symposium. Washington, D.C.: August, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Toward Cleaner Water - The New Permit Program to Control Water Pollution. 1974.

U.S. Environmental Protection Agency, Office of Water Supply. Training Strategy. October 21, 1976.

U.S. Environmental Protection Agency, Office of Research and Development. Who's Who II in the Interagency Energy/Environment R & D Program. October, 1976.

U.S. Environmental Protection Agency. Work Plan Handbook for Section 208 Areawide Waste Treatment Management Planning. February, 1975.

U.S. Environmental Protection Agency. "Worker Protection Standards for Agricultural Pesticides." Federal Register. Vol. 39, No. 92, May 10, 1974.

U.S. Federal Energy Administration. Careers in Energy Industries. 1975.

U.S. Federal Energy Administration. Directory of State Government Energy-Related Agencies. September, 1975.

U.S. Federal Energy Administration, National Energy Information Center. Review and Evaluation: Presidential Task Force on Power Plant Acceleration. August, 1976.

U.S. Federal Energy Administration. Project Independence Blueprint Final Task Force Report: Labor Report. Washington, D.C.: November, 1974.

U.S. Federal Energy Administration, Presidential Task Force on Power Plant Acceleration. Status Significant U.S. Power Plants In Planning or Under Construction. July 1, 1976.

U.S. Federal Power Commission. Federal Power Commission 1975 Annual Report. 1975.

U.S. Federal Power Commission. The Federal Power Commission: What it is and What it Does. Washington, D.C.: 1977.

U.S. Nuclear Regulatory Commission. Construction Status Report - Nuclear Power Plants - Data for Decisions. December, 1976.

U.S. Nuclear Regulatory Commission. Operating Units Status Report - Licensed Operating Reactors - Data for Decisions. March, 1976.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Air Pollution Control Program - 1975 Annual Report. July, 1976.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Pesticide Control Program. January, 1977.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Report on Water Quality, Virgin Islands, U.S. of A. 1970 - 1975. June, 1975.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs. Virgin Islands Territorial Plan for Certification of Commercial and Private Applicators of Restricted Use Pesticides. Febraury, 1976.

U.S. Virgin Islands, Department of Health, Division of Environmental Health. Air Quality Control Implementation Plan for the U.S. Virgin Islands. 1972.

Reports

Alabama Department of Public Health, Environmental Health Administration, Division of Public Water Supplies. Evaluation of the Semi Public Water Supplies in Alabama. Montgomery: Alabama Water Improvement Commission, 1975.

Alabama Water Improvement Commission. 1973-1974 Biennial Report. 1974.

American Chemical Society. Solid Wastes - An Environmental Science and Technology Reprint Book. Washington, D.C.: American Chemical Society, 1971.

American Iron and Steel Institute. Summary Report of Solid Waste Processing Facilities. Washington, D.C.

American Public Health Association. Public Exposure to Ionizing Radiations. New York: American Public Health Association, 1958.

American Society of Civil Engineers. Ground Water Management. New York: American Society of Civil Engineers, 1972.

American Society for Testing and Materials. Biological Methods For the Assessment of Water Quality. Symposium Proceedings. Philadelphia: American Society for Testing and Materials, 1973.

Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities. Roles and Responsibilities for Developing a Comprehensive State Water and Wastewater Operator Training Program. Prepared for the U.S. Environmental Protection Agency, Office of Water Program Operations. July, 1976.

Atlanta Regional Commission. Chattahoochee Corridor Study. Atlanta: July, 1976.

Atlanta Regional Commission. Possibilities for Water Conservation in the Atlanta Region. Atlanta: March, 1976.

Baker, Robert A. Taste and Odor in Water: A Critical Review. Manufacturing Chemists Association Report F-A233. May, 1967.

Blair, Louis H. and Schwartz, Alfred I. How Clean is Our City? A Guide for Measuring the Effectiveness of Solid Waste Collection Activities. Washington, D.C.: Urban Institute, 1972.

Bloom, Sandra C. and Degler, Stanley E. Pesticides and Pollution. Washington, D.C.: Bureau of National Affairs, 1969.

Boyd, Eldon M. Protein Deficiency and Pesticide Toxicity. Springfield. Ill.: Thomas, 1972.

Burke, Jacqueline M. and Fisher, Westin A. The Realities of Recycling. Minneapolis: Minnesota Pollution Control Agency, 1973.

Committee on Boundary Noise. The Regulation of Steady-State Noise Sources at Boundaries in Municipalities of North Carolina. North Carolina: September, 1973.

Committee of Tin Mill Products Producers, American Iron and Steel Institute. Progress Report on Recycling. Washington, D.C.

Committee of Tin Mill Products Producers, American Iron and Steel Institute. Restrictive Container Legislation. Washington, D.C.: March, 1976.

Cornell, Howland, Hayes, Merryfield, Clair A. Hill and Associates. Wastewater Treatment Plant Staffing Guidelines. Prepared for U.S. Environmental Protection Agency. October, 1972.

Coughlin, R. W. Air Pollution and Its Control. New York: American Institute of Chemical Engineers, 1972.

Dasmann, Raymond F., et al. Ecological Principals for Economic Development. Prepared for the International Union for Conservation of Nature and Natural Resources, and the Conservation Foundation. New York: J. Wiley, 1973.

Degler, Stanley E. and Bloom, Sandra C. (eds.). Federal Pollution Control Programs: Water, Air, and Solid Wastes. Washington, D.C.: Bureau of National Affairs, 1969.

Frost, and Sullivan, Inc. The Solid Waste Control Market. Report 141. May, 1972.

Gendel, Eugene B., et al. Manpower Analysis: Municipal Wastewater Treatment Facilities in New England. Prepared for U.S. Environmental Protection Agency. October, 1972.

Georgia State Board of Examiners for Certification of Water and Wastewater Treatment Plant Operators. Water and Wastewater Operator Certification in Georgia - Progress Report, July 1, 1975 - June 30, 1976. Atlanta, 1976.

Goldstein, E., et al. Air Pollution and Methods of Control. New York: MSS Information Corp., 1973.

Gould, Robert F. (ed.). Organic Pesticides in the Environment. Washington, D.C.: American Chemical Society, 1966.

Groman, William A. Forest Fertilization. Prepared for U.S. Environmental Protection Agency. Washington, D.C.: August, 1972

League of Women Voters Education Fund. Municipal Sludge: What Shall We Do With It? Current Focus Series Publication No. 627. 1976.

League of Women Voters Education Fund. Recycle - In Search of New Policies for Resource Recovery. Publication No. 132. Washington, D.C.: 1972.

League of Women Voters Education Fund. Solid Waste - It Won't Go Away. Current Focus Series Publication No. 675. April, 1971.

League of Women Voters Education Fund. Solid Waste Management: The National Issues. Community Guide Series Publication No. 134. 1972.

League of Women Voters of the United States. Study of Solid Waste Management. Community Guide Series Publication No. 699. November, 1971.

Lee, Lester. Smog: A Report to the People. Pasadena: California Institute of Technology, 1972.

Mackinney, H. W. Disposal of Plastics With Minimum Environmental Impact. American Society For Testing and Materials Special Publication 533. Philadelphia: 1973.

McClellan Air Force Base. Interim Report on Pilot Programs for Pesticide Monitoring of Water on Air Force Bases. National Technical Information Service Report AD-751 894. December, 1969.

Moreau, David H., et al. Regional Water Resource Planning For Urban Needs. Raleigh: Water Resources Research Institute of the University of North Carolina, 1973.

National Academy of Sciences. Report on Motor Vehicle Emissions to the EPA. Washington, D.C.: National Academy of Sciences, 1973.

National Association for Environmental Education. Current Issues in Environmental Education-1975: Selected Papers From the Fourth Annual Conference of the National Association for Environmental Education. Edited by Robert Marlett. Columbus: The ERIC Center for Science, Mathematics and Environmental Education, 1975.

National Association for Environmental Education. Current Issues in Environmental Education - II: Selected Papers from the Fifth Annual Conference of the National Association for Environmental Education. Edited by Robert Marlett. Columbus: The ERIC Center for Science, Mathematics and Environmental Education, 1976.

National Center for Resource Recovery. Putting Solid Waste and Resource Recovery in Perspective. Washington, D.C.: 1976.

National Field Research Center, Inc. An Environmental Manpower Projection Study. 7 Volumes. Prepared for U.S. Environmental Protection Agency and the Illinois Board of Higher Education. Iowa City, Iowa: 1975.

National Field Research Center, Inc. State of Illinois, Environmental/Energy Education in the Pubic Community College System. Prepared for U.S. Environmental Protection Agency and the Illinois Board of Higher Education. Iowa City, Iowa: 1975.

National Planning Association. The Demand for Scientific and Technical Manpower in Selected Energy-Related Industries, 1970-1985: A Methodology Applied to a Selected Scenario of Energy Output. A Summary.

North Carolina Agricultural Extension Service. North Carolina Pesticide Training Manual. September, 1973.

North Carolina Water Resources Research Institute. The Effects of Sewer Surcharges on the Level of Industrial Wastes and the Use of Water By Industry. National Technical Information Report PB-213 267/8. August, 1972.

Olympus Research Corporation. Manpower Planning for Wastewater Treatment Plants. Prepared for the U.S. Environmental Protection Agency, Office of Water Programs.

Patterson, W. L. and Banker, R. F. Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities. Prepared for the U.S. Environmental Protection Agency, Office of Research and Monitoring. October, 1971.

South Carolina Department of Education. Environmental Education: A Source Book for Educators. Columbia: South Carolina Department of Education, 1976.

Southwest Georgia Planning and Development Commission. Energy Management and Conservation in the 14-County Southwest Georgia APDC. Camilla: January, 1976.

Spindletop Research, Inc. Economic Situation Issues Description: Coal Mining. Prepared for the Kentucky Development Cabinet. June, 1974.

Spindletop Research, Inc. Kentucky's Coal Manpower: An Updated Assessment of Needs and Availability for Increased Production through 1985. Prepared for the Kentucky Development Cabinet. December, 1974.

Stern, Carlos, et al. Impacts of Beverage Container Legislation on Connecticut and a Review of the Experience in Oregon, Vermont and Washington State. Report to the Connecticut State Legislature, Department of Environmental Protection, by members of the University of Connecticut Department of Agricultural Economics. March 12, 1975.

Tennessee Valley Authority. 76 Annual Power Report. Knoxville: Tennessee Valley Authority, 1976.

Tennessee Valley Authority. TVA 75 Annual Report. Knoxville: Tennessee Valley Authority, 1975.

Virginia Polytechnic Institute and State University. Improving Water Quality by Removal of Pesticide Pollutants with Aquatic Plants. National Technical Information Service Report PB-495/6. August, 1972.

Young, Dennis. How Shall We Collect the Garbage? A Study in Economic Organization. Washington, D.C.: Urban Institute, 1972.

Zinger, Clem L., et al. Environmental Volunteers in America: Findings and Recommendations of the Steering Committee of the National Center For Voluntary Action (NCVA) Environmental Project. Washington, D.C.: National Center For Voluntary Action, 1973.

Unpublished Material

Agee, James L. Remarks before the Association of American Pesticide Control Officials, Inc. Washington, D.C.: April 7, 1975.

American Chemical Society. Photochemical Smog and Ozone Reactions. Conference Proceedings. Washington D.C.: American Chemical Society, 1972.

Baylay, Dr. Ned T. Management Decisions Regarding Farm Chemicals. Paper presented at 1971 National Agricultural Outlook Conference. Washington, D.C.: U.S. Department of Agriculture, 1971.

Cairns, John, Jr. and Dickson, K. L. (eds.). Biological Methods for the Assessment of Water Quality. Symposium proceedings of the American Society for Testing and Materials. Philadelphia: American Society for Testing and Materials, 1973.

Sopper, William E. and Kardos, Louis T. (eds.). Recycling Treated Municipal Wastewater and Sludge Through Forest and Cropland. Symposium proceedings, Pennsylvania State University. University Park: Pennsylvania State University, 1973.